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MADRAS RECORD OFFICE.

ED Government of Madras.

Public works DEPARTMENT.

G.O. No. 2782	Press
354-55	Mis.
Dated 19 11	1870 .

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*Proceedings of the Madras Government, Public Works Department,
19th November 1870.*

No. 354. Read the following letter from the Acting Consulting Engineer for Irrigation and Canal Company, to the Secretary to Government, Public Works Department, dated Madras, 22nd September 1870, No. 73 :—

From Agent, No. 167, 23rd April 1870.
To do. „ 63, 3rd June „
From do. „ 95, 6th July „
To do. „ 114, 15th do. „
From do. „ 365, 27th Aug. „
To do. „ 173, 7th Sept. „
From do. „ 406, 19th do. „

I HAVE the honour to submit the correspondence as per margin with the revised estimates amounting to Rupees 19,63,370 for the completion of the 2nd Section Main Canal, and showing an increase of Rupees 1,33,700 over the existing sanction.

2. The amounts of the existing sanction for this work are as follow :—

	RS.
By G. O., No. 1,078, dated 8th April 1867	8,550
Do. „ 3,195, „ 15th October „	17,91,600
Do. „ 1,498, „ 8th May 1869	14,260
Do. „ 1,537, „ 11th do. „	1,960
Do. „ 932, „ 2nd April 1870	13,300

Total... 18,29,670

3. The estimate now submitted being as stated above for Rupees 19,63,370, the increase is Rupees 1,33,700, which is made up as follows.

4. The total increase of expenditure over the existing sanction, as shown by the revised estimate now submitted, is Rupees 2,17,051-15-6, deducting from which the total of savings on some items as given in the Comparative Statement Rupees

* For protecting walls to stop leakage in G. O., No. 932, 2nd April 1870. 70,051-15-6, and Rupees 13,300* sanctioned subsequent to the preparation of these documents, the difference Rupees

1,33,700 is the net increase for which sanction is now asked.

5. The revised estimates show that there was increase on some miles and decrease of expenditure on others on the same sort of work. I therefore give the particulars thereof in *juxtaposition* against each item :—

No.	Increase.			Decrease.		
	RS.	A.	P.	RS.	A.	P.
1. Earth-work	64,483	10	6	4,668	14	6
2. Canal walls	14,015	13	10	52,524	9	1
3. Rubble bank	19,545	5	10	1,127	10	1
4. Revetment and shingling	6,905	11	7	837	14	0
5. Repairing slips	2,000	0	2	1,772	11	0
6. Masonry works	3,013	0	5	8,312	14	0
7. Puddling	16,991	0	3			
8. Ferry boat				807	6	10
9. Sundries	5,847	4	11			
Total for Works	1,32,801	15	6	70,051	15	6
10. Depreciation of General Plant	30,000	0	0			
11. Store and proportion of Store charges	54,250	0	0			
Total	2,17,051	15	6	70,051	15	6

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6. From this it will be observed that the first nine items of increase and decrease appertain strictly to works, and aggregate Rupees 1,32,801-15-6 and 70,051-15-6, respectively. I have twice applied to the Chief Engineer for an explanation of the causes which led thereto, but the only reply to my reference on this point is as follows: "The real cause of excess, which was not provided for at all in the estimates except as far as the contingencies would cover it, was the unexpected extent to which the banks settled, notwithstanding that they had been tested beforehand with water up to bed level or thereabouts. This swallowed up much more than the excess of Rupees 5,000 or 6,000, and the petty extras would probably not have been noticed had not the Engineers in charge found their available money run away with in restoring settlement, so that they latterly noted carefully any work which could be considered extra." The Statement marked D., however, shows that out of the net increase of expenditure on works which comes to Rupees 62,750, Rupees 35,382-1-6 was for new or extra works not provided for in the last revised and sanctioned estimates, and the remainder, Rupees 30,367-14-6, consists of expenditure for the most part on account of Stores and Store charges which was incurred on the sanctioned works before the 31st May 1867, but was omitted to be included as such in the estimate last sanctioned, namely, in Government Order, No. 3,195, of 15th October 1867.

7. The Chief Engineer attributes the 10th and the 11th items of increase, namely, Rupees 30,000 and 54,250 for Stores and proportion of Store charges, etc., to his not having made provision for the prime or actual cost of the Stores in the last sanctioned estimates, but only an item of Rupees 50,000 for depreciation of Plant, Tools, and Stores in stock, and this he states was done in accordance with the instructions conveyed in the Government Orders marginally noted.

No. 3,676, 4th December 1865.
.. 1,006, 27th March 1866.

These orders, however, simply disallowed in the estimates for the 4th and 5th sections one-half of the sum which was provided for Plant, as that portion was not intended to form a permanent charge against those works, because those estimates professed to show the actual ultimate cost of the works, but they did not, as was supposed by Mr. Latham, order the exclusion of the necessary provision in estimate rates which should as a matter of course include working tools and sundry articles of stores necessary for the execution of works. The Agent in his last letter on the subject, No. 406 of the 19th instant, states that on account of Stores and proportion of Store charges, and depreciation of General Plant, Rupees 1,19,507-6-2 stand debited to the Section in his books, out of which sum Rupees 44,619-9-5 form a "permanent" charge to the Section, consisting of depreciation of General Plant and proportion of Store charges, the remainder, Rupees 1,04,867-12-9, form a "non-permanent" charge, consisting of the value of Tools and Stores which, according to paragraph 3 of his letter quoted above, is subject to be reduced by the value of these articles at the time of their transfer to other works or by their sale proceeds, in case the latter course was found necessary.

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8. As far as I can judge from the papers before me, the exact state of the

	RS.	A.	P.
*As per Statement D. ...	32,302	1	6
Deduct, sanctioned since the preparation of this Statement as said in paragraph 4 of this letter ...	13,300	0	0
	19,082	1	6

	RS.	A.	P.
† Items referred to in para. 7.	30,000	0	0
Do. do. " 7.	54,250	0	0
Do. do. " 6.	30,367	14	6
	1,14,617	14	6

case is that out of the sum of Rupees 1,33,700 for which sanction is now asked, Rupees 19,082-1-6* are for new Works not provided for in the sanctioned estimates as stated in paragraph 6 of this letter, and the remainder, Rupees 1,14,617-14-6,† consists mainly, if not wholly, of book charges on account of Stores, proportion of Store charges, and depreciation of General Plant, which were incurred and adjusted in the Agent's books prior to the submission of the last revised estimates sanctioned

in Government Order No. 3,195 of the 15th October 1867, and ought to have been included as expenditure in that estimate.

9. The sanction in Government Order No. 3,195 of the 15th October 1867 to the last revised estimate of the 2nd Section was given on the condition of the Government being furnished, prior to the final passing of the expenditure thereon, with the particulars specified in paragraph 17 of the Consulting Engineer's

† No. 76, 23rd September 1867.

letter† referred to in that Order, and on the understanding that the precaution suggested in paragraph 11 of the same letter for the safety of the revetments and banks should be adopted by the Company; but the Chief Engineer states that he has not yet been able to have the necessary measurements of work taken, and the required particulars of their actual cost deduced and estimated; and with respect to the precautions suggested to be taken for the safety of the revetments and banks, I beg to draw attention to paragraphs 8 and following of his letter noted in the margin, in which he says that he would willingly have proposed anything for that purpose which seemed necessary, safe, and practicable, and within the means of the Company; and then he goes on to show that he found it would be unsafe or impracticable to carry out the suggestions referred to; but from later correspondence I learn that the Chief Engineer is now taking the requisite steps to having a complete estimate of the portion of the canal as completed prepared, together with drawings of all masonry works as actually built, and the quantities in this estimate being priced with regard to the rates which have from time to time prevailed will show what is the fair value of the whole Section as compared with the total expenditure on it. I also understand that he has in hand an estimate of the cost of raising all masonry and puddle core walls and banks.

No. 1,265, 17th August 1870.
Agent's No. 365, 27th do. "

From the Agent and Manager, Madras Irrigation and Canal Company, to the Consulting Engineer, Madras Irrigation and Canal Company, dated Madras, 23rd April 1870, No. 167.

I HAVE the honour to forward for sanction the undermentioned estimates for the completion of the 2nd Section, with copy of the Chief Engineer's letter, No. 574, of 13th April 1870.

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2. The plan of the slip in the 32nd mile, referred to in paragraph 10 of the Chief Engineer's letter, has not come to hand, but it has been called for and will be forwarded to you immediately on receipt.

1 Revised estimate of earth-work and masonry.

1 Abstract estimate do.

1 Detail Bill of Cost for new masonry wall, 29th mile.

1 Do. for repairing slips in 21st, 22nd, 24th, 26th, 27th, 29th, 31st, and 32nd miles.

1 Statement showing causes of excess over sanctioned estimate.

1 Comparative Statement.

From the Chief Engineer, Madras Irrigation and Canal Company, to the Agent and Manager, Madras Irrigation and Canal Company, dated Kurnool, 13th April 1870, No. 574.

I HAVE the honour to apply for sanction for an expenditure of Rupees 1,47,000 for completing the 2nd Section.

2. This expense is due partly to new works estimated to cost Rupees 35,620, including making good the slips of last season, and securing all such puddle core walls as are not in cutting. The rest is due mainly, if not wholly, to book charges for Plant and Stores.

3. The accompanying sheet shows that a heavy adjustment for past charges took place just as my estimate was submitted, the result of which was that Government sanctioned an expenditure, Rupees 69,622, less than they approved as necessary for the sanctioned work then remaining to be done. The Progress Certificate of May showed Rupees 14,55,389 spent up to 31st May 1867, but the adjustment of charges debited the work with Rupees 69,622 more, so that the June certificate made, which I will detail to the best of my power.

4. As above stated, extra works require an increased expenditure of ... RS. 35,620

In June 1867, an increase of Rupees 69,622 was made by adjustments of Stores and Store charges. The previous estimates made no provision for the expense of buying and maintaining the general stock of stores. Of this sum, Rupees 11,151* was debited directly to works, and Rupees 58,471† was temporarily entered as Store, Store charges, etc. ... 69,622	
* Rupees	14,55,794
"	14,41,613
Rupees	11,151
† 1st June	69,217
31st May	10,746
Increase...	58,471

Up to 30th November 1869 the item of "Plant depreciation" was exceeded by Rupees 28,782, ‡ owing to the prime cost of Plant issued to works being included in it, and the inconvenience found to attend any attempt to credit the works with the value of Plant returned from them. ... 28,782	
‡ Rupees	78,782
"	50,000
Rupees	28,782

In May 1867 a charge of Rupees 10,746 stood against the item Stores, etc., which was intended to be recovered and the balance charged to "Depreciation of Plant," and no other provision was made for it.

5. It seems that up to 30th November 1867 the amount standing to the charge of Stores and Store charges, incurred previous to the sanction of the last estimate, has been reduced to Rupees 54,228-4-5, which must include the charge for General Stores; while the rest has, I presume, been charged over particular works, viz. Rupees 14,989§.

§ Rupees

"

Rupees

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6. I recommend the following adjustment of the estimate in order to meet the above :—

(1.) That for new works as detailed in the accompanying estimates these be sanctioned ... RS. * 35,620	
(2.) Under head of "Store and Store charges" to cover the cost of the General Stock of Stores, apportioned to this Section ... 54,250	
(3.) That to cover the cost of Plant (Stores issued to the Section) an item "Plant" be substituted for "Depreciation of Plant," with an amount of Rupees 80,000, or an addition to sanction of ... 30,000	
(4.) That to the item of "Amount expended up to 31st May 1867" charged to works in the estimates last sanctioned there be added† ... 26,140	
Over-expenditure on works ... 990	
† Rupees	11,151
"	14,989
Rupees	26,140
Total ...	1,47,000

This last item is due either to more Store charges made direct to the works beyond those included in the certificate of June 1867 and incurred before that date, or to actual excess of cost of the works.

7. In carrying out the work it has been found best to make terms with contractors of a kind which rather disarranges the heads of expenditure, in one case especially. The shingling and revetting is almost entirely done with stone out of the cuttings, the chief exceptions being in a part of the 24th, 27th, and in the 32nd miles. In such cases the cost of shingling will depend upon how the stone is delivered to the contractor. If the rock spoil he needs for shingling be delivered to him near his work, the shingling will appear in the books as costing little. If he have to purchase it from the contractor of excavation, it will appear very much larger. Arrangements were made as seemed most likely to work well according to the ability of the contractor or sub-contractors and their command of labour or cartage. The former mode of paying has been nearly universally adopted, thus making the cost of "shingling" low at the expense of "earthwork."

8. Modifications were also made in the choice of walls or puddle protection to the front of the banks. At first, in the face of such an immense total mass of intended wall, arrangements for puddling the most likely portions were made, whether puddling or wall were intended in the estimate. Again, when the masonry was under complete command it was found time would be saved by joining it up or extending it slightly over lengths where puddle and shingle had been talked of.

9. There was difference of opinion in 1867 as to the allowance necessary for the subsidence of old banks, and an allowance was made in the 3rd Section, but only a margin of contingencies left for the 2nd Section, through ten miles of which water had already passed, and all of which had been exposed to many monsoons, and, in the tanks, to some standing water. The subsidence, however, proved to have been so much when the banks were finally made up last summer that the margin proved inadequate, and the cost of carrying the earth up the high banks has swallowed up the general saving on the rest of the work.

10. I enclose a Statement for sanction, supporting it by the detail of such part of the work as seems to need fresh sanction, (including some slips which hardly deserve notice). The heaviest repairs required since 1867 have been the dry rubble wall in 29th mile, and the slip in the 32nd mile, of which latter I enclose a plan. The dry rubble (puddle core) wall in the 29th mile, after absorbing a great quantity of puddle at a very long lead, finally gave way and required a masonry wall to make it secure. I now propose a puddled foreshore to this bank.

11. I cannot account for the 6,421 cubic yards by which the cutting has exceeded the estimate in the 19th mile. I am informed that the surveys of the first few miles of the 2nd Section were those made under Mr. East who had already advertised for contractors, just at the time of his leaving the division. The measuring up of the work was done with the usual care by the Assistant Engineer, and it is unlikely that any mistake then took place under Mr. Browning. Little was paid under Messrs. Cotton and East, and the excess was paid by Mr. Stoney during my absence on leave. The excess of 6,000 yards in 50 chains of cutting having a surface of about 95 square yards per yard, indicates some decided error.

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12. In the H. II. forms I am aware that *addition* excess is shown on the 19th and 25th miles. In the former this is possibly due to some error in wording a voucher for money paid on account (B. Voucher); in the latter it is due to the "removal and replacing of bank" at the back of new walls, sanctioned at 23,422 cubic yards, being entered as "banking" in the expenditure. 2,500 cubic yards of rocky spars in the 22nd mile, and the descent channel in the 23rd (454 cubic yards), and some other excavation also appear under the head of Excavation in the expenditure, though not provided for under that head in the estimate. I do not see any more cases calling for explanation.

13. These estimates are really mere bills of cost of the work previously sanctioned, and of the slips and repairs executed last season, excepting only the puddled foreshores to dry rubble walls which have been sanctioned since the estimates were framed.

HINDRY DIVISION, 2ND SECTION.

Past expenditure up to 31st May 1867, sanctioned in G.O., No. 3195, of 15th October 1867, taken from the May certificates (H.II. form) :—

	RS.	A.	P.
Expenditure and charges made directly to works ...	14,44,642	15	8
Store and Plant charges entered separately ...	10,746	3	11

Past expenditure up to 1st June 1867 as shown in the June certificate (H. II. form) :—

	RS.	A.	P.
Expenditure and charges made directly to work...	14,55,793	14	1
Store and Plant charges entered separately ...	69,217	0	1

Expenditure up to 30th November as shown in the November certificate (H. II. form) :—

	RS.	A.	P.
Expenditure and charges made directly to works...	18,08,638	14	1
Store and Store charges entered separately ...	51,228	4	5
"Plant Depreciation" ...	78,782	4	6
	19,41,619	7	0

From the Acting Consulting Engineer, Madras Irrigation and Canal Company, to the Agent and Manager, Madras Irrigation and Canal Company, dated 3rd June 1870, No. 63.

I HAVE the honour to acknowledge the receipt of your letter No. 167 of 23rd April 1870, giving cover to one from the Chief Engineer, No. 574, of the 13th idem, submitting for sanction revised estimates of the 2nd Section of Main Canal, and to observe as follows.

2. The sanction in G. O., No. 3,195, of the 15th October 1867, to the last revised estimate of the 2nd Section was given on the condition of the Government being furnished, prior to the final passing of the expenditure thereon, with the particulars specified in paragraph 17 of the Consulting Engineer's letter* referred to in that order.

* No. 76, 23rd September 1867.
and on the understanding that the precaution suggested in paragraph 11 of the same letter for the safety of the revetments and banks should be adopted by the Company. The estimate now submitted professes to comprise the actual final cost of all the works in the Section, and shows that the expenditure that was to be incurred in January last was only Rupees 17,265. This sum, it is presumed, has been expended, and all the works completed by this time. It therefore, in applying for sanction to this estimate, becomes

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necessary first of all to comply with the provisions of the sanction above quoted; but the Chief Engineer not having furnished any information whatever on this point, I request that he may be asked to do so.

3. The amount for which sanction is now asked for is Rupees 1,47,000, which the Chief Engineer states consists of Rupees 35,620 for expenditure on new works, or works not included in the sanctioned estimates; Rupees 30,000 expended on the item of Plant depreciation in excess of the provision made on this account in the sanctioned estimate; and Rupees 54,250 plus 26,140 for expenditure incurred on account of Stores and Store charges, and which was adjusted in your accounts to the debit of the works in the 2nd Section in the accounts for June 1867, but was omitted to be shown as expenditure in the revised estimate† last sanctioned in G. O., No. 3,195, 15th October 1867, and the last item is Rupees 990 for over-expenditure on works.

4. But this Statement of the Chief Engineer differs from the results arrived at by the estimate† received with your letter under acknowledgment. The estimate shows that the expenditure on new works not provided for in the sanctioned estimates to be (as particularized in the margin) Rupees 25,221-2-9, instead of Rupees 35,620 as given by the Chief Engineer.

	RS.	A.	P.
20th Mile, Forming tow-path ...	18	0	0
21st do. Repairing slip as per Bill of Cost.	31	11	6
22nd do. Guide pillars ...	45	0	0
22nd do. Road alteration ...	345	10	11
22nd do. Repairing slip as per Bill of Cost.	333	13	4
23rd do. Road alteration ...	33	5	1
23rd do. Packing stone on outer slope ...	50	0	0
23rd do. Rubble drain on do.	55	0	0
24th do. Removing and reforming bank ...	29	8	0
24th do. Removing bund ...	2	8	0
25th do. Puddling ...	2	6	0
26th do. Puddling the face of No. 2 wall...	3,918	12	0
26th do. do. do. 3 do.	2,582	4	0
26th do. do. do. 12 do.	12	11	8
26th do. Repairing slip as per Bill of Cost.	23	9	1
27th do. Removing silt ...	4,007	14	0
27th do. Puddling...	27	6	8
27th do. Repairing slip as per Bill of Cost.	6	4	0
28th do. Removing bund ...	6,159	5	3
29th do. New masonry wall ...	17	0	0
29th do. Repairing slip as per Bill of Cost.	5,596	2	0
29th do. Puddling the face of No. 4 wall...	535	1	10
29th do. Puddling bank...	7	0	0
30th do. Removing and reforming bank ...	52	3	2
31st do. Repairing slip as per Bill of Cost.	348	8	5
32nd do. Puddling ...	1,524	14	10
32nd do. Repairing slip as per Bill of Cost.	25,771	2	9

excess, as given in the comparative estimate, should therefore be furnished in regard to the heavy items of earth-work, canal wall, revetments, rubble bank, etc. Savings of large amount in the construction of canal walls should also be explained.

5. Estimates for new works to the amount of Rupees 35,620 are stated to have accompanied the Chief Engineer's letter, but those which were received with your letter are only two: one for Rupees 2,187-5-2 for repairing the slips, and the other for Rupees 6,159-5-3 for the new masonry wall in the 29th mile, both amounting to Rupees 8,346-10-5. What have become of the other estimates?

6. With regard to the omission in the estimates last sanctioned of the expenditure which was incurred previous to its submission for sanction, it is observed that the expenditure was adjusted in your accounts for June 1867, while the estimates were not submitted until September 1867, or nearly three months after the adjustment took place. How was the expenditure omitted in the estimate? The Government will probably look for some explanation on this point.

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From the Chief Engineer, Madras Irrigation and Canal Company, to the Agent and Manager,
Madras Irrigation and Canal Company, dated Kurnool, 29th June 1870, No. 1,003 :—
2nd Section Estimates.

Your No. 463 of 7th instant.

Consulting Engineer's No. 63 of 3rd instant.

The analysis of the sanctioned estimates will be sufficient for our purpose if we divide them into four heads, viz :—

- A.—Items of work included in the estimates.
- B.—Adjustments of Store charges to the above, not included in either old or new estimates.
- C.—Plant, not included in the old estimates, but partially so, under head "Depreciation of Plant," in the new.
- D.—Unadjusted Store charges, not included in either estimate.

2. On the 31st May 1867 the past expenditure is given as follows in the Progress Certificate, including a slight adjustment made therein :—

Class A.	Rupees 14,33,975 10 7
" B.	" 10,721 11 3
" C.	" 37 3 5
" D.	"
Total	14,44,734 9 3

On 1st June 1869 the past expenditure is given as follows, not taking into account Store charges already adjusted to items of work on the 31st May 1867 :—

Class A.	Rupees 14,33,975 10 7
" B.	" 21,817 9 6
" C.	" 20,265 11 4
" D.	" 48,951 4 9
Total	15,25,010 14 2

3. It is clear that items B. and D. being unprovided for in the sanctioned estimates, require sanction. They amount to Rupees 70,768-14-3.

4. Up to 30th November 1869 the item D. had swelled to Rupees 54,228-5-5, showing a further sum of Rupees 5,277-0-8 requiring sanction, or a total of Rupees 76,045-14-11.

5. The item C., for which Rupees 50,000 were sanctioned in the new estimates, amounted to Rupees 78,782-4-6, and was therefore overspent by Rupees 28,782-4-6.

6. In my Statement showing causes of excess, dated 13th April, I seem to have taken the addition to expenditure in Plant made between 31st May and 1st June, viz., Rupees 9,544-0-1 twice over, owing to their being included in sundries in the estimate, first, as money really spent but not included in the estimate of expenditure on 31st May, and, again, in the total excess of Plant charges. However this be the statement as above seems correct and clear. It shows a total requiring sanction under these Classes B, C, D., of at least Rupees 1,04,828-3-5, and an increase of estimate due to work, and undetected adjustments, Class A., of Rupees 12,172.

7. In the absence of Mr. Knorpp, Mr. Dodson has made up a list of such extra works as he finds in the Cash Ledger which are not entered separately in my estimate, not being so in the Progress Certificate. They include items, many insignificant, of ramps or lumps of spoil, or unevenness of bed not detected in the measurements, and special jobs in repairs of banks; but they illustrate the kind of finishing up, for which the contingencies allowed in the estimates of October 1867 proved insufficient, seeing that they had already borne much of the cost of the general making up of settlement of banks. The list quoted by Colonel Carpendale amounts to Rupees 25,771-2-9, or with 10 per cent. contingencies to Rupees 28,348. Mr. Dodson's list amounts to Rs. 6,478-9-11, or with contingencies to Rupees 7,126, making a total of Rupees 35,474.

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8. This leaves about Rupees 6,500 unaccounted for; it is possible I have overlooked some adjustments charged to sanctioned items, which the estimate contemplated being spent entirely on the works which may have been made in the interim and may have escaped notice. This error, if it be so upon the adjustment of the charges of the whole division, is about $\frac{1}{2}$ per cent., or, if it be considered an excess upon the last sanction of Rupees 4,10,476, is $1\frac{1}{2}$ per cent. upon an estimate in which no special allowance was made for the settlement of old banks. I trust this explanation may be considered sufficient.

9. Before finally passing the expenditure the Government need a statement of the work executed, showing for instance the number of sluices and capacities of the works. I have nearly completed a map of the whole canal on which all these particulars are shown, and hope to forward you a copy for Government before September. The detail of the expenditure on the last estimate is recorded in the Divisional Cash Ledgers, and there will be no difficulty in making a record of the quantity and cost of the work as a whole, for estimating future similar work. I regret that I have had my staff occupied, as the Government supposed would be the case, so incessantly, that to prepare full detail measurements of old work has been out of the question, without very serious delay, even if it were desired or possible—(See Major Mullins' to Secretary to Government, No. 86, 1st November 1866, paragraph 5.)

10. The extra works have so far exhausted my disposable balance that it would jeopardize our contract to keep Engineers, after their work of construction is over, solely to compile records of old works; and I hope that the Government will not press for them until the completion of the work leaves the time of the Engineers available for this, or Mr. Dodson can compile them.

11. As to the extra work proposed by Major Mullins, the core walls have been or are being all corrected and raised at considerable expense, except in cuttings. The raising of the masonry revetment, 18 inches, as proposed, will only cost about Rupees 1,200 a mile, and may be best done after the final water-level is ascertained.

12. Although the adjustment of Store charges by you, upon the plan desired by Major Mullins, began seriously to affect the certificates of work in June 1867, they were not completed for some time. I see adjustments to the amount of about Rupees 6,300 in the certificate of last November. It was impossible to estimate what their final amount would be, and as it did not involve expenditure, but only account, I hope there will be no objection to the delay in applying for their sanction.

13. It is satisfactory to know that all the improvements sanctioned in the last estimate have been efficiently completed and extended, rather than curtailed; besides much subsidiary protective work, such as backing up walls with dry rubble, etc., etc.

MADRAS IRRIGATION AND CANAL COMPANY.

HINDRY DIVISION.

List of Works not previously sanctioned.

No. of Mile.	Description.	Quantity.	Rate.	Amount.	Total.	Remarks.
19	Embankment ...	...	...	RS. A. P. 65 10 8	496 14 8	For settlement. Extra works.
19	Revetment ...	...	...	431 4 0		New repairs.
21	No. 12, Culvert repairs	...	...	150 0 0	150 0 0	For Settlement. No provision was made in the last estimate.
22	Raising bank ...	...	...	875 0 0	934 0 0	New repairs. Repairing a leak. Do.
22	Clearing berm ...	472 0 2 0	...	59 0 0		No provision was made in the last estimate. Do.
24	Repairing Kaderbagh aqueduct	...	...	63 0 0	85 0 0	No provision was made in the last estimate. Do.
24	Do. bank ...	...	...	10 0 0		Do.
24	Earth-work ...	...	...	12 0 0		Do.
25	Removing spoil out of cutting...	...	...	4 0 0		Do.
25	Do. stones...	No. 115	...	21 9 0		Do.
25	Masonry bench-marks ...	34 3 0 0	...	9 12 0		Do.
25	Clearing berm ...	200 0 4 0	...	50 0 0		Do.
25	Stop bank ...	240 0 4 9	...	71 4 0		Do.
25	Repairs to bank ...	24	...	4 0 0		Repairing ram.
26	Descent channel ...	1,458	...	918 3 4	160 9 0	No provision was made in the last estimate. Do.
26	Clearing berm ...	200 0 4 0	...	50 0 0		Do.
26	Removing spoil...	71 0 2 0	...	8 14 0	977 1 4	Do.
27	Do. stones ...	250 0 1 0	...	15 10 0	15 10 0	Do.
28	Packing stones ..	...	...	64 8 0		Repairing a leak. Do.
28	Repairing bank	639	...	58 10 4	123 2 4	

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List of Works not previously sanctioned.—(Concluded.)

No. of Mile.	Description.	Quantity.	Rate.	Amount.	Total.	Remarks.
29	Puddling ...	3,172	Various.	RS. A. P. 1,385 12 10	1,385 12 10	No provision was made in the last estimate.
30	Rubble drain in outer slope	...	...	185 0 0		Repairing a leak.
30	Removing spoil...	985 0 1 0	...	55 0 0		No provision was made in the last estimate.
30	Earth-work ...	372	Various.	175 9 2	415 9 2	Repairing a slip, etc.
31	Stone packing on outer slope ...	...	...	112 8 0		Do. a leak.
32	Earth to rubble drain in outer slope	...	...	117 0 0	112 8 0	Do.
32	Stone do.	...	...	470 0 0		Do.
32	Cutting...	2,688	Various.	716 10 7	1,303 10 7	Supplemental Estimate sent in to the C. E., with my letter, No. 459 of 24th February 1869.
	Total...	...	...		6,159 13 11	

KUENNOOL,
29th June 1870.

(Signed) A. J. DODSON,
Executive Engineer.

(True Copy.)

(Signed) J. H. COX,
Assistant to Chief Engineer.

No. 295.

Copy forwarded to the Consulting Engineer, with reference to his No. 63, dated 3rd June 1870.

MADRAS,
6th July 1870.

(Signed) F. H. HENSLOWE,
Agent and Manager.

*Proceedings of the Madras Government, Public Works Department,
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From the Acting Consulting Engineer, Madras Irrigation and Canal Company, to the Agent and Manager, Madras Irrigation and Canal Company, dated 15th July 1870, No. 114.

In acknowledging your No. 295 of the 6th instant, communicating the Chief Engineer's No. 1,003 of 29th June, in reply to mine No. 63 of the 3rd idem, I have the honour to state that your correspondence does not furnish any explanation as required by me regarding the revised estimates for the 2nd Section of the Main Canal.

2. The Chief Engineer* repeats in another shape the same particulars as given in his former letter† respecting the excess expenditure on the items of Plant, Stores, Store charges, etc., and regarding which no further points referred by me.

* No. 1,003, 29th June.

† No. 574, 13th April.

3. In the 4th paragraph of my letter‡ explanation was requested regarding the causes of excess expenditure beyond sanction in the heavy items of earth-work, canal walls, revetments, rubble banks, etc.; and of the large savings in the construction of other canal walls as shown in the comparative Supplemental Estimate.

‡ No. 63, 3rd June.

4. In paragraph 5 I noticed the non-receipt of certain estimates for new works, which were said to have been forwarded with the Chief Engineer's former letter; and in paragraph 6 I requested to be informed why certain expenditure, which was adjusted in your accounts in June 1867, was not taken into account in the estimates that were submitted in September 1867, or three months after the adjustment took place, whereby the Government was incorrectly informed as to the actual expenditure at that time on the 2nd Section. I have now to request further consideration of my former letter, and that I may be fully and clearly informed on each point referred.

From the Agent and Manager, Madras Irrigation and Canal Company, to the Consulting Engineer, Madras Irrigation and Canal Company, dated 27th August 1870, No. 365.

With reference to your letter, No. 114, dated 15th July 1870, I have the honour to transmit copy of the Chief Engineer's letter, No. 1,265, of the 17th August, furnishing the explanations required by you regarding the revised estimates of the 2nd Section.

From the Chief Engineer, Madras Irrigation and Canal Company, to the Agent and Manager, Madras Irrigation and Canal Company, dated Kurnool, 17th August 1870, No. 1,265.

I HAVE the honour to reply to Colonel Carpendale's No. 63 of 3rd June last, as explained by his No. 114 of 15th ultimo.

2. The G. O., No. 3,195 of 15th October 1867, sanctioned my expending on the 2nd Section a sum which, as affected by G. O., No. 1,498 of 8th May 1869, and No. 1,537 of 10th May 1869, amounted to Rupees 18,16,370. From this sum was excluded all expenditure which would not be a permanent charge against the works, as ordered in G. O., No. 3,676 of 4th December 1865, for the 4th Section, and laid down in paragraph 2 of the letter of the Consulting Engineer attached to that G. O. The exclusion of such permanent charges from estimates was again expressly ordered in G. O., No. 1,006, of 27th March 1866, and after that time I ceased to insert in my estimates any sum to cover the prime cost of Stores, Tools, or Plant, until recently, after the Government had strongly expressed a wish that sanction should be asked to cover all expenditure—a wish I have been glad to see expressed.

3. The first move made by Government in this direction, so far as I am aware, was in the Consulting Engineer's letters to you, No. 206 of 14th November 1867, and No. 251 of 15th January 1868, in which he requested you to charge all expenditure on Stores ratably against the several items or descriptions of work in the several sections of canal. Since such charges had been by Government Order wholly excluded from the estimates, the result was necessarily in a great many cases an excess of expenditure on the items of work.

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4. In the 2nd Section you give me, in your No. 641 of 5th instant, the total of these non-permanent charges, the insertion of which in the Progress Certificates was now, for the first time, allowed up to the end of December 1869, as—

	RS.	A.	P.
Stores and charges thereon	64,781	2	1
Plant (prime cost)	78,269	10	4
Total...	1,43,050	12	5
Remaining to be apportioned...	6,456	9	9
Total...	1,49,507	6	2
Say...	1,50,000	0	0

To the expenditure of Rupees 18,16,370, sanctioned up to May 1869, has since been added Rupees 13,300, by G. O., No. 932, of 2nd April last, making total sanctioned

18,29,670	0	0
Add non-permanent charges	1,50,000	0 0
Add extra work variously estimated, say	28,348	0 0
Total...	20,08,018	0 0

Of these non-permanent charges an allowance of Rupees 50,000 was sanctioned to cover estimated depreciation, and this needs to be deducted from the above, because it is not wanted if the prime cost be charged. This reduces the amount requiring sanction; supposing the estimates up to date not to have been exceeded to Rupees 19,58,018, less the Rupees 18,29,670 which had been sanctioned, and the balance of Rupees 1,28,348 requires sanction. I have asked for sanction for Rupees 1,33,700, or Rupees 5,352 in excess of the above; of which Rupees 1,218 is to cover any further expenses on Plant, and Rupees 4,134 (about) remains to be accounted for.

5. Now a deduction should be made from the charges for Stores and Plant for the value of any Stores and Plant actually consumed in the work, and therefore a permanent charge. The only Stores and Plant so used that I am aware of would be iron-work in sluices of which there are 12 (calingulah 10 wall sluice, calingulah 13 and 14), and such Madras teak as was used for framing them, and the tar and paint used upon them. This might raise the balance to be accounted for to Rupees 5,000 or 6,000; but I fear the exact details are irrecoverable.

6. It has been pointed out that small extra works may be cited to cover this balance; but the real cause of excess, which was not provided for at all in the estimates, except so far as the contingencies would cover it, was the unexpected extent to which the banks settled, notwithstanding that they had been tested beforehand with water up to *bed level* or thereabouts. This swallowed up much more than the excess of Rupees 5,000 or 6,000, and the petty extras would probably not have been noticed had not the Engineers in charge found their available money run away with in restoring settlement, so that they latterly noted carefully any work which could be considered *extra*.

7. Colonel Carpendale's No. 63, paragraph 2.—The G. O., No. 3,195, orders that no statement of work actually executed is necessary; but that the finished work, forming part of the final arrangement, should be accurately ascertained; that is, I presume, the actual top-breadths and slopes of banks should be noted, and the work that has proved *necessary* be all computed. Plans of masonry works such as will be useful, without a measurement of past work, with their actual quantities, are also required; the whole is to be priced at the rates that have prevailed, and the value of the Section so obtained. I cannot do this at once without calling in Mr. Browning, for Mr. Dodson is fully occupied. If it be imperative, I can call Mr. Browning in for six weeks without serious inconvenience.

8. I certainly have not as yet been able to act fully up to the 2nd paragraph of G. O., No. 3,195, of 15th October 1867, which states that the sanction for the expenditure and plans I proposed for the completion of the 2nd Section (permanent charges) is given "on the understanding

that the precaution suggested in paragraph 11 for the safety of the revetments and banks is adopted." I would willingly have proposed anything for that purpose which seemed necessary, safe, and practicable, and within the means of the Company.

9. The face walls sanctioned on 17th March 1865 are very light, and only two feet above water level—See Fig. 2. The masonry walls without bank were invariably two feet above water level. The masonry revetment, Fig. 3, at the Hindry aqueduct was only one foot above water level, with a four feet berm (making six feet including wall), and then a slope of bank five feet higher.

10. I need not discuss the dry rubble walls which have been dealt with. The Government understanding was, so far as I understand it—

(1.) That *simple walls* should be left as they were 2'0" above water level. To these I put a heavy shingle backing up to a height of three feet above bed level, where they were more than ten feet high. It had been reported that the upper part of these walls was solid.

(2.) That *face walls*, backed by earth to coping level, should be raised to 3½ feet above water level. Now the Section of neither old nor new walls was adapted for this. I should say that such a measure would lead certainly to the destruction of the old wall Fig. 2. In Fig 1 the new wall stands already ten feet above its counterfort at bed level, and if raised it must have been made at least six inches thicker throughout, a course not suggested. I tried the effect of running up the wall only to the dotted lines, but I found it unsafe while the banks were under construction, for the labourers always brought the bank up also. Other reasons made me willing to leave this parapet, if it is to be erected, till the last thing, for it would never be tolerated when the canal came to be navigated. I consider the banks quite safe as they are, where faced with this wall, supposing means taken to prevent excessive rise of water above the full water level.

(3.) That *masonry revetment* when used should have a berm behind it at coping level, and in rear of that the banks should be raised to full height for bank just as if revetted with dry stone. The only masonry revetment to banks proper (i.e., not forming part of a masonry work), is that shown in Fig. 3 on either side of the Hindry aqueduct. I do not consider it sound in principle. The wash of water on to the berm, which is assumed to be expected in this case, must be trying to the revetment, which reposes on the bank. In fact, the compound catastrophe which occurred during the recent floods by which the bank was softened and the revetment fell backwards in one spot, and the weight of the bank forced the revetment forwards in another, proves how critical the balance of such a structure must always be.

Paragraph 3.—Since the Returns before me proved confusing, I have written to you for the accurate figures, and have given them above. With respect to the setting off of saving against excess, or in other words disposing the sanctioned amount of protection to best advantage, I have no more to add to what was contained in my first letter, No. 574, of 13th April last. No doubt the consciousness of having saved in one length would have some effect when the question of where the protective work might safely stop came to be settled elsewhere. It is an indubitable fact that during the recent calamitous flood of 7th instant, when I believe double the drainage which the canal was intended to receive entered it, not only no case of failure of any bank protected by the works executed under this estimate (that is since 1863) occurred, but no case of failure of any unprotected bank occurred. The failures were confined to a calingulah, two walls, and a protective masonry revetment, every one of which were completed before February 1865.

11. Paragraph 6.—The estimates were framed upon the latest Progress Certificate available at the time. The latest received up to this date is that for May last. But I should hardly have been justified in including those non-permanent charges in my estimate, Government not having up to that time distinctly called for estimates to cover the non-permanent charges.

12. No. 114, paragraph 2.—Mr. Browning reports that his calingulahs will be completed in a month from this date, and it will be the quickest and most satisfactory way of giving detail information (which I did not understand to be required) for him to lay down the work as executed on the cross sections of canal when he prepares the other information desired.

FIG. 1
FACE WALL. 1867

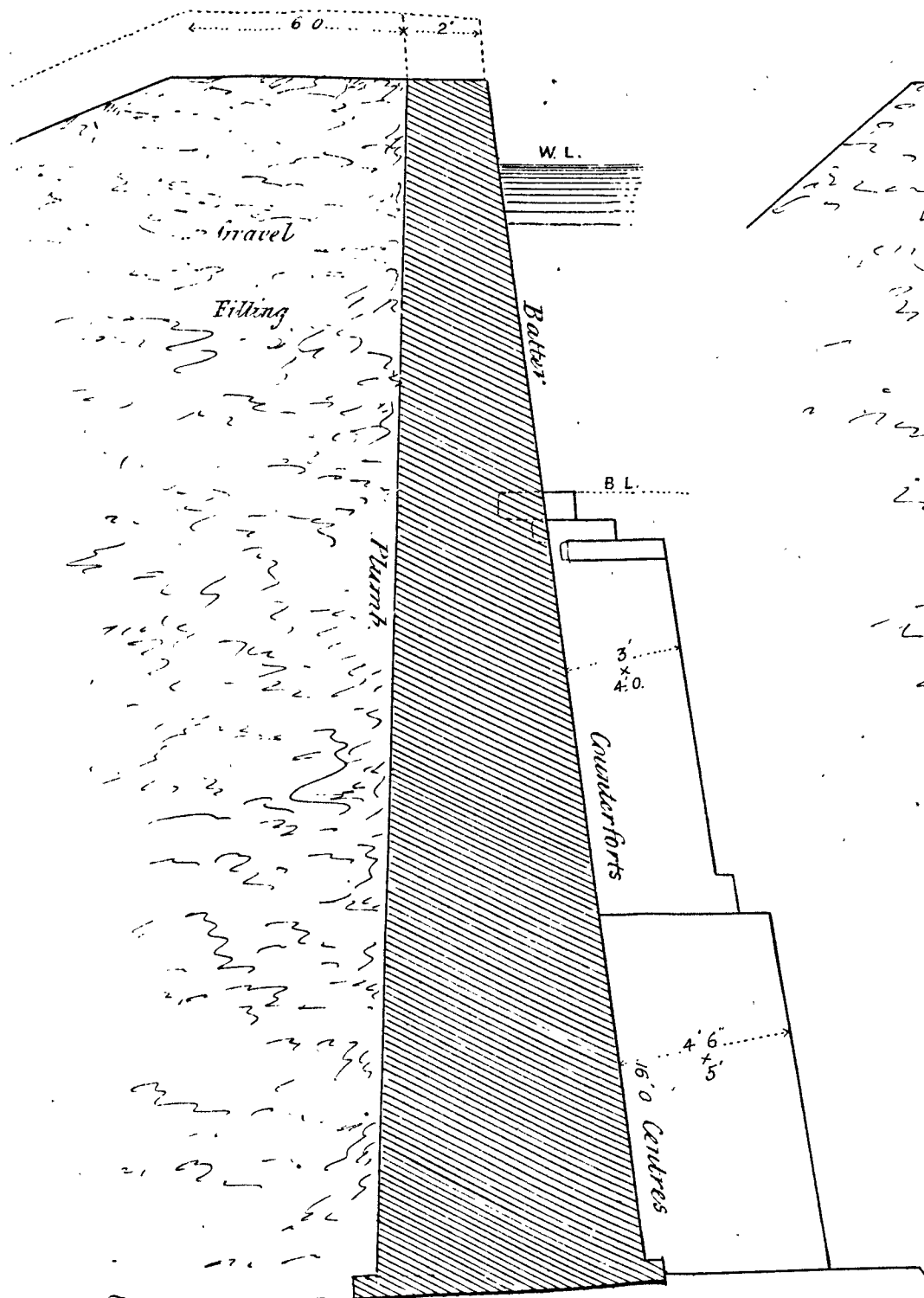
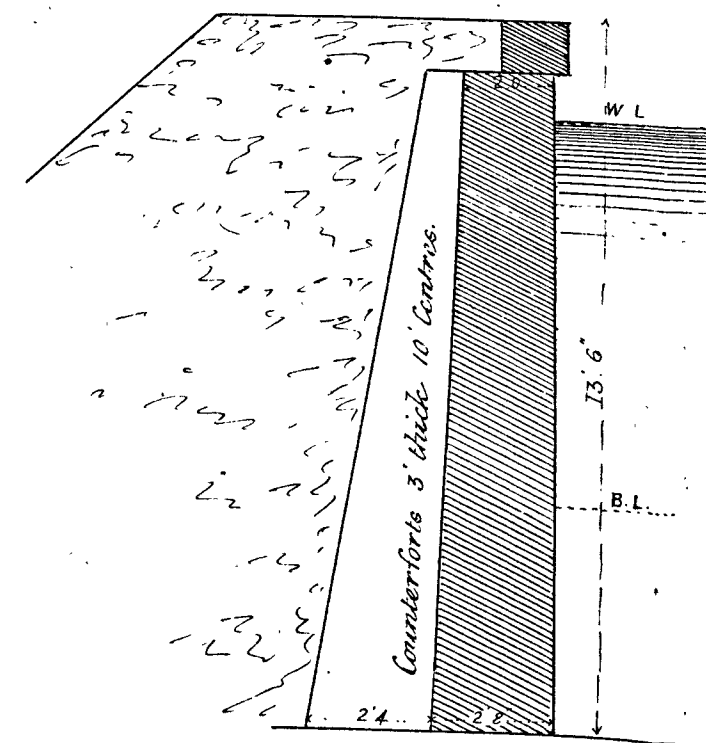


FIG. 2.
38TH MILE FACE WALL.
as sanctioned P.M.G. 17th March 1865.

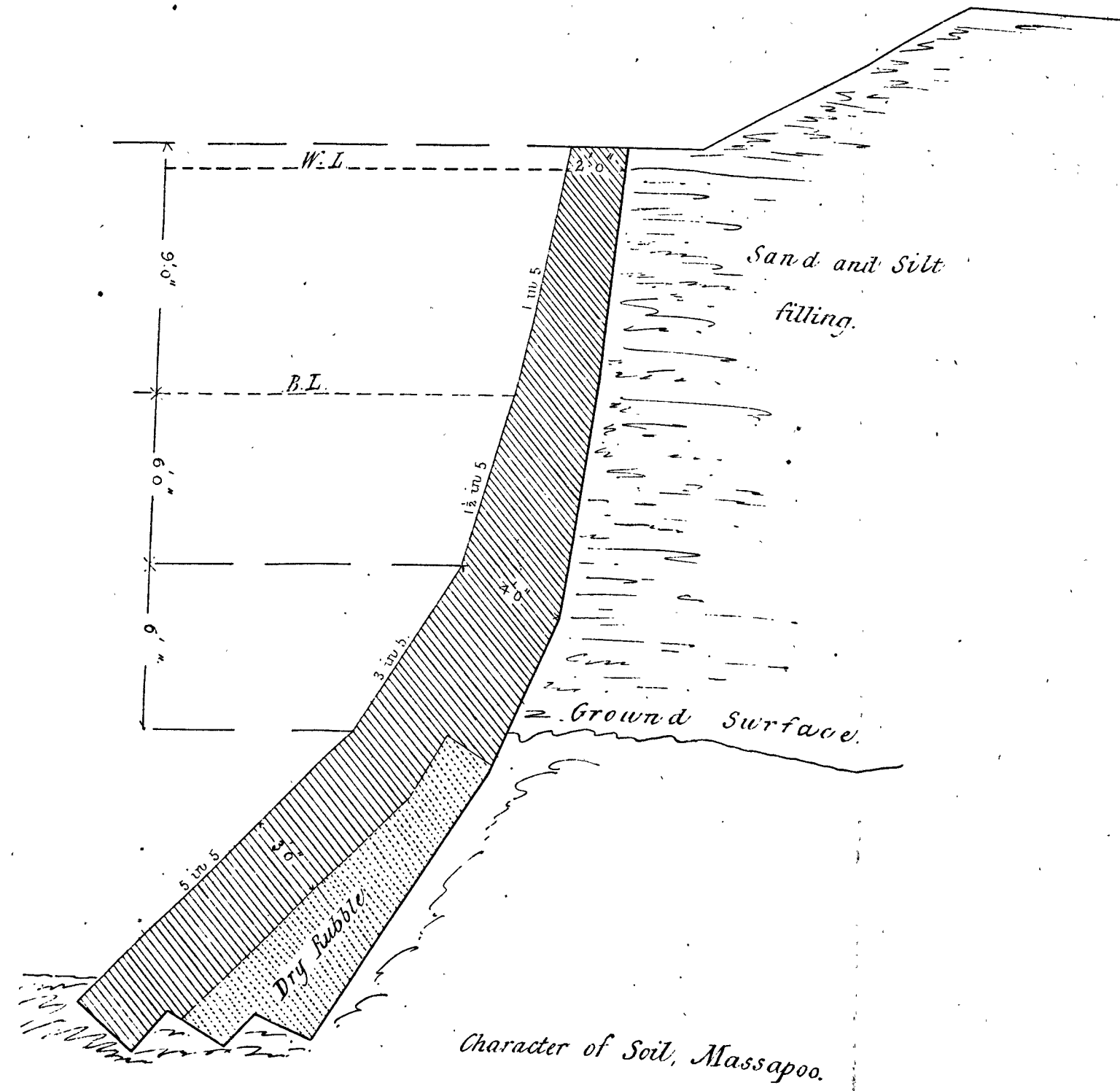


Scale 4'-1"

FIG. 3.
MASONRY REVETMENT 18TH MILE.

Completed Feb^y 1865.

SCALE 5 FEET = 1. INCH.



17

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13. *Paragraph 3.*—The particular list which lay before me when I estimated extra work at about Rupees 35,620 has been mislaid or corrected, or was misquoted in my letter. I cannot recollect distinctly what list it was. The works in question are so trifling that they would in ordinary cases, beyond what are quoted in Colonel Carpendale's list, be properly reckoned as contingent, and be covered by the sum sanctioned for contingencies. I have in the commencement of this letter restated the particulars of the adjustments, which were finally carried out in a way very confusing to the Engineers who had to work to the estimates as sanctioned; but that was by the Consulting Engineer's arrangement so far as I know.

From the Acting Consulting Engineer, Madras Irrigation and Canal Company, to the Agent and Manager, Madras Irrigation and Canal Company, dated 7th September 1870, No. 173.

In reference to the Chief Engineer's letter regarding excess expenditure on 2nd Section, communicated with your No. 365 of 27th August last, I have the honour to inform you that I am quite unable to dispose of the revised estimates from not understanding what your and the Chief Engineer's intention is in regard to the items for Plant, Stores, and Store charges.

2. In the estimates already sanctioned there is provided, on account of	Rs.
depreciation of General Plant, an item of	50,000
And as I understand from the papers now submitted a further sum on the	
same account (depreciation) is now asked for amounting to	30,000
And in addition for Stores and proportion of Store charges	54,250

Total ... 1,34,250

Now it is necessary for me to know exactly for what these sums are wanted, how they are to be finally debited if they are all permanent charges, and if not what proportion is a temporary charge, and how the 2nd Section is hereafter to be relieved of them. The Chief Engineer in his 2nd paragraph confuses non-permanent and permanent charges. In his 4th paragraph I understand him to say that he has now, for the first time, learnt from you the total of *non-permanent* charges for the 2nd Section, amounting to Rupees 150,000, of which he remarks 50,000 Rupees was formerly sanctioned, and must be deducted, *because it is not* wanted if the prime cost is charged; but I cannot tell from the estimates whether the prime cost is charged or not; nor can I discover from the 5th paragraph of the Chief Engineer's letter what is the value of Stores and Plant to form a permanent charge against the 2nd Section. I hope you will be able to explain matters, and to distinctly inform me what are permanent and what are temporary charges, and how the 2nd Section will be relieved of the temporary charge. Also, what is the exact meaning of the item of Rupees 54,250 for Stores, and the proportion of Store charges. I should have supposed that all ordinary tools were provided for in the rates allowed for work, and that timber, iron and such like were in the estimated cost of sluices; and if so, I cannot comprehend the large item of Rupees 54,250 for Stores, and must trouble you to give me the details of the charge.

3. I conclude and hope it will not be necessary to incur the delay of referring to the Chief Engineer.

From the Agent and Manager, Madras Irrigation and Canal Company, to the Consulting Engineer, Madras Irrigation and Canal Company, dated Madras, 19th September 1870, No. 406.

With reference to your letter, No. 173, dated 7th instant, I have the honour to hand you a summary statement showing cost of Stores and Store charges, Tools and depreciation of Plant debited to the 2nd Section works, amounting to Rupees 1,49,507-6-2, from the commencement up to 31st December 1869. The statement also shows what proportion of this sum forms a permanent charge, and what proportion a non-permanent or temporary charge against the Section.

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2. *Permanent* charges, as their name implies, are items of Store adjustment, which when once written off to any particular section or work are *final*, and form a portion of the total cost of the work. These are depreciation of General Plant and Store charges.

3. *Non-permanent* charges are the value of Tools and Stores which remain at the debit of the Section until such time as they are transferred to another section or work, or disposed of by sale; the difference between the original cost and the estimated value at the time of transfer, or in the case of sale, the original value and actual proceeds being debited to the works on which they had been used.

4. Rupees 54,250 is for Stores issued to the debit of the 2nd Section, and for the proportion of Store charges apportioned on the work; but all ordinary tools are provided for in the rates allowed for work, and the timber, iron, etc., are included in the estimated cost of sluices. The details of the charge are so voluminous that I have deferred giving them for the present, but if they are absolutely necessary they shall be furnished you.

MEMORANDUM.

2ND SECTION.

Permanent.

Depreciation of General Plant	...	...	...	...	28,263	0	8	RS.	A.	P.
Store charges	...	...	...	...	16,376	8	9			

Tools and Stores	...	...	...	...	44,639	9	5			
	...	...	...	...	1,04,867	12	9			
Total...					1,49,507	6	2			

No. 355.

ORDER THEREON, 19th November 1870, No. 2,782.

IRRIGATION, No. 28.

In Proceedings of Government noted below sanctions, amounting in the aggregate to Rupees 18,29,670, were accorded for the works of the 2nd Section of the Madras Irrigation and Canal Company's Main Canal.

Procs. Madras Govt., G. O. No. 1,078, dated 8th April 1867...	RS.
Do. do. " 3,195, " 15th October " ...	8,550
Do. do. " 1,498, " 8th May 1869 ...	17,91,600
Do. do. " 1,537, " 11th do. ...	14,260
Do. do. " 932, " 2nd April 1870 ..	1,960
Total...	13,300
	18,29,670

2. With his letter above recorded the Acting Consulting Engineer submits a further revised estimate of Rupees 19,63,370, exhibiting a net increase of Rupees 1,33,700 over previous sanctions.

3. It is explained that of the large excess last mentioned a sum of Rupees 19,082-1-6 only appertains strictly to *New Works* not provided for in the revised estimate which received the approval of Government in Proceedings of the 15th October 1867, No 3,195, and that the remainder, Rupees 1,14,617-14-6, made up of the following items, represents book adjustments on account of Stores, propor-

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tion of Store charges, and depreciation of General Plant, the outlay on which was incurred and apportioned in the Agent's books prior to the submission of the last revised estimate, but, for some reasons not clearly explained, was not included therein:—

	RS.	A.	P.
Depreciation of General Plant	30,000	0	0
Stores and proportion of Store charges	54,250	0	0
Expenditure for the most part on account of Stores and Store charges incurred on sanctioned works before 31st May 1867, but not included as such in the estimate last sanctioned	30,367	14	6
Total...	1,14,617	14	6

4. Of the causes which have led to this large increase the explanations rendered by the Company's Officers are meagre and most unsatisfactory. The sanction accorded in G. O., No. 3,195, of the 15th October 1867, was given on the distinct understanding that the Government were to be furnished with plans of all masonry works executed, and with the price of all kinds of work done on the Section with reference to the rates which have from time to time prevailed, in order that a fair valuation of the undertaking, as completed in an efficient manner, might be arrived at, and it was further made contingent upon the adoption by the Chief Engineer of the precautions for the safety of the revetments and banks suggested by Major Mullins in paragraph 11 of his letter printed with the order sanctioning the estimate. Up to date the requisite information has not been supplied, and it would appear that only now is an estimate being made of the cost of carrying out the measures for the safety of the canal banks which were ordered to be undertaken in October 1867.

5. The Government are greatly disappointed to find that their orders above referred to have been neglected by the Company's Officers, but looking to the delay in the completion of the Section which the rejection of the estimate would involve, and considering the stipulations as to time under which the canal works are being carried out, His Excellency in Council will not withhold his sanction to the revised estimate as it is at present laid before Government.

(True Extract.)

Colonel, R.E.,

Secretary to Government.

To the Consulting Engineer for the Madras Irrigation and Canal Company,
with 13 Enclosures.
.. the Agent and Manager for do. do.

Exd. T. O'Connor.

12 N. sheet 133700 which is made up as follows.

Gobt. of 1870 Madras.

PUBLIC WORKS.

To
THE CONSULTING ENGINEER FOR
THE MADRAS IRRIGATION AND
CANAL COMPANY.
&c, &c, &c.

Dated November 19th.

Recd.

Encl

G. O., 19th November 1870, No. 2782.

NOVEMBER.

Nos. 354-355

Main Canal.—The revised estimate of Rupees 19,63,370 for the completion of the 2nd Section of the Madras Irrigation and Canal Company's Main Canal, sanctioned with remarks.

Enclosures
4 Letters in orig: from Agent
3 " " " " " "
6 Estimates
13.

Consulting Engineer Office
Irrigation & Canal Company
Madras, 22nd Sept/70.

No. 73.
Sir,
Colonel, Harpindale, P.O.
Agent for S. & Co.
The Secretary to Government
Public Works Department.

I have the honor to submit the correspondence as per margin with the revised estimates amounting to Rupees 19,63,370 for the completion of the 2nd Section Main Canal and showing an increase of Rupees 1,33,700 over the existing sanction.

2. The amounts of the existing sanction for this work are as follow:

	Rs.
By G.O. No. 1078 d/s April/67	8550
in do. 3195-15 Oct/67	1791600
in do. 1498-8 May/69	14260
in do. 1537-11 May/69	1960
in do. 932-2 nd April/70	13300
Total Rs.	1829670

3. The estimate now submitted being as stated above for Rupees 19,63,370 the increase is Rupees 1,33,700 which is made up as follows:
The

4. The total ^{increase of} expenditure over the existing sanction as shown by the revised estimate now submitted is Rupees 217,051-15-6, deducting from which the total of savings on some items as given in the Comparative statement Rupees 70,051-15-6 and Rupees 13,300 sanctioned subsequent to the preparation of these documents ^{* for protecting walls & stop leakage in G.C. 11:932-2 April 77} the difference Rupees 133,700 is the net increase for which sanction is now asked.

5. The revised estimates show that there was increase on some miles and decrease of expenditure on others on the same sort of work. I therefore give the particulars thereof in justa position against each item:

	Increase.	Decrease
1- Earthwork	64,483 10 6	4,668 14 6
2- Canal walls	14,015 13 10	52,524 9 1
3- Rubble bank	19,545 5 10	11,27 10 1
4- Revetment & chinking	6,905 11 7	837 14 "
5- Repairing slips	2,000 " 2	1,772 11 "
6- Masonry works	3,013 " 5	8,312 14 "
7- Puddling	16,991 " 3	" " "
8- Ferry boat	" " "	807 6 10
9- Sundries	5,847 4 11	" " "
Total for works		132,801 15 6
10- Depreciation of General plant	30,000 " "	70,051 15 6
11- Store & proportion of store charges	54,250 " "	" " "
Total		217,051 15 6

6. From this it will be observed that the first 9 items of increase and decrease appertain strictly

to works, and aggregate Rupees 132,801-15-6 and 70,051-15-6 respectively. I have since applied to the Chief Engineer for an explanation of the causes which lead thereto, but the only reply to my reference on this point is as follows: "The 'real cause of excess which was not provided for at all in the estimates except as far as the Com- 'ingencies would cover it, was the unexpected ex- 'tent to which the bank settled notwithstanding 'that they had been tested before hand with water 'up to bed level or thereabouts. This swallowed up 'much more than the excess of Rupees 5 or 6,000 'and the petty extras would probably not have been 'noticed had not the Engineers in charge found that 'available money run away with in restoring 'settlements, that they latterly noted carefully 'any work which could be considered extra'. The statement marked D however shows that out of the net increase of expenditure on works which comes to Rupees 62,750 Rupees 32,382.1.6 was for new or extra works not provided for in the last revised and sanctioned estimates, and the remainder Rupees 30,367-14-6 consists of expendi- ture for the most part on account of stores and store charges which was incurred on the sanctioned works

works before the 31st May 1867, but was omitted & be included as such in the estimate last sanctioned viz: in Government Order N^o 3195 of 15th October 1867.

7. The Chief Engineer attributes the 10th and the 11th items of increase viz: Rupees 30,000 and 54,250 for stones and proportion of stone charges & his not having made provision for the prime or actual cost of the stones in the last sanctioned estimates, but only an item of Rupees 50,000 for depreciation of Plant, tools and stores, in which and this he states was done in accordance with the instructions conveyed in the Government Order marginally noted. These orders however simply disallowed in the estimates for the 10th and 11th sections one half of the sum which was provided for plant, as that portion was not intended to form permanent charge against those works, because those estimates professed to show the actual ultimate cost of the works, but they did not, as was supposed by Mr. Vatham, order the exclusion of the necessary provision in estimate rates which should as a matter of course include working tools and sundry articles of stones necessary for the execution of works. The Agent in his last letter

N^o 3676-4th Decr/65.
" 1006-27th March/66.

on the subject N^o 406 of the 19th instant states that on account of stones and proportion of stone charges and depreciation of General Plant, Rupees 149,507-6-2 stand debited to the Section in his books out of which sum Rupees 14,639-9-5 form a "permanent" charge to the Section consisting of depreciation of General Plant and proportion of stone charges the remainder Rupees 104,867-12-9 form a "non-permanent" charge consisting of the value of tools and stores which according to para: 3 of his letter quoted above is subject to be reduced by the value of these articles at the time of their transfer to other works or by their sale proceeds in case the latter course was found necessary.

8. As far as I can judge from the papers before me the exact state of the case is that out of the sum of Rupees 133,700 for which sum is now asked Rupees 19,082-1-6 are for new works not provided for in the sanctioned estimates as stated in para: 6 of this letter

As per staff D^o N^o 32382-1-6
Deduct sanctioned since
the preparation of this
staff as said in para: 6 of
this letter - 13300 - " - "
19082-1-6

and the remainder Rupees 114,617-11-6 consists
mainly if not wholly of book charges on account
of stones proportion of stone charges and depreciation of General Plant which were incurred and adjusted

* Memo referred to in
para: 7 - Rs: 30,000
" - 54,250
" - 303,67-11-6
114,617-11-6

adjusted in the Agents' books prior to the submission of the last revised estimates sanctioned in Government Order N^o 3195 of the 15th October 1867, and ought to have been included as expenditure in that estimate.

7. The sanction in Government Order N^o 3195 of the 15th October 1867 to the last revised estimate of the 2nd Section was given on the condition of the Government being furnished prior to the final passing of the expenditure thereon with the particulars specified in para: 17 of the Consulting Engineer's letter N^o 76-23 Sept/67 referred to in that order, and on the understanding that the precaution suggested in para: 11 of the same letter for the safety of the revetments and banks should be adopted by the Company but the Chief Engineer states that he has not yet been able to have the necessary measurements of work taken, and the required particulars of their actual cost deduced and estimated, and with respect to the precautions suggested to be taken for the safety of the revetments and banks they draw attention to paras: 8 and following of his letter noted in the margin, in which he says N^o 1265-17 Aug/70 Agt N^o 365-27 that he would willingly have proposed anything for that purpose which seemed necessary, safe, and practicable, and within the means of the Company, and then he goes on to show that he found it would be unsafe or impracticable to carry

carry out the suggestions referred to: but from later correspondence I learn that the Chief Engineer is now taking the requisite steps to having a complete estimate of the portion of the Canal as completed prepared ^{together} with drawings of all masonry works as actually built, and the quantities in this estimate being priced with regard to the rates which have from time to time prevailed, will show what is the fair value of the whole Section as compared with the total expenditure on it. I also understand that he has in hand an estimate of the cost of raising all masonry and puddle core walls and banks.

I have the honor to be,
Sir,
Your most obedient servant
J. M. W. C. C. C.
J. M. W. C. C. C.

W. M. W.

2782 P. M. D.
 Proceedings of the Madras Government
 Under date the 19th Oct 1900
 Read the following.

From.

The S. B. Engineer
 for S. C. Co.

(H. E. No. 73 of 22nd Sept 1900)

In Proceedings of
 Govt. noted below sanctions
 amounting in the aggregate
 to Rs 18,29,640
 were accorded for the works
 of the 2nd section of the
 Madras Irrigation and
 Canal Company's main
 canal.

Pro: Madras Govt G. O. 1078 dated 8 th April/67.	Rs
" " " 3195 " 15 th Decr. "	8550
" " " 1498 " 8 th May/69	17,916 00
" " " 1537 " 11 th "	12,260
" " " 932 " 2 nd April/70	1960
	13,300
	<u>18,29,640</u>

With

By A.
 The Secretary to Govt. S. C. Co.

And to the S. B. Engineer
 for S. C. Co.

Enc. 13.

Submitted for the consideration
 of the Govt. the within
 mentioned sanction from the
 sanctioning authority.

Amounting to Rs. 18,29,640 for
 the completion of the 2nd section
 Main Canal.

No. 2782-19 of 1900

No. 2782

2782-19 of 1900

With his letter above
recorded the Acting Comg.
Engineer submits a further
revised estimate of Rs
19,63,370, exhibiting a
net increase of Rs 1,33,700
over previous sanction.

It is explained that
of the large excess last
mentioned a sum of
Rs 19,082-1-6 only apper-
tains strictly to new work
not provided for in the
revised estimate which
received the approval
of Govt in Proceedings
of the 15th October 1867.
No. 3195, and that the
remainder Rs 1,14,617-14-6
made up of the following
items, represents back
adjustments

31 37
adjustments on account of
stores, proportion of store
charges, and depreciation
of General Plant, the
outlay on which was
incurred and appor-
tioned in the Agents
book prior to the sub-
mission of the last
revised estimate, but,
for some reasons not
clearly explained, was
not included therein.

Depreciation of General Plant.	Rs 30,000-0-0
Stores, and proportion of store charges.	54,250-0-0
Expenditure for the most part on account of stores and store charges incurred on sanctioned work before 31 st May/67, but not included as such in the estimate last sanctioned.	30,367-12-6

1,14,617-14-6

of

Of the causes which
have led to this large in-
crease the explanations
rendered by the Com-
pany's officers are meagre
and most unsatisfactory.
The sanction accorded in
G. O. No. 3195 of the 15th
October 1867 was given
on the distinct under-
standing that the Govt
were to be furnished
with plans of all ma-
jor works executed,
and with the price of
all kinds of work done
on the section with
reference to the rates
which have from time
to time prevailed, in
order that a fair valuation
of

38
of the undertaking, as
completed in an efficient
manner, might be arrived
at; and it was further
made contingent upon
the adoption by the
Chief Engineer of the
precautions for the safety
of the revetments and
hauls suggested by
Major Mullins in para 11
of his letter printed
with the order sanc-
tioning the estimate.
Up to date the requisite
information has not
been supplied, and it
would appear that
only now is an estimate
being made of the cost
of carrying out the measures
for

for the safety of the Canal
works which were
ordered to be undertaken
in October 1867.

The Govt are
greatly disappointed
to find that their orders
above referred to have
been neglected by the
Company's officers
but looking to the
delay in the completion
of the Section which
the rejection of the
estimate would involve
and considering the
stipulations as to time
under which the Canal
works are being carried
out: His Excellency in
Council

Council will not
withhold his sanction
to the revised estimate
as it is at present
laid before Government.

A. B.

To
The Comd Engr for the Madras
S & C Co with 13 Encls. /
Agent & Manager. do do /

Recd 24/11/70-

CP 3807

Govt. of Madras.

PUBLIC WORKS.

To The Consulting Engs for
the Madras Irrigation
and Canal Company

Date

Recd.

Ex-1

G. O. 19 June 2782

Nos. 354 & 355

Main Canal. The revised
estimate Rs. 19,63,370 for
the completion of the Section
of the Madras Irrigation
Canal, sanctioned with re-
marks.