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MADRAS RECORD OFFICE.

Government of Madras.

Police DEPARTMENT.

G.O. No. <u>1162</u>	Press Mis.
<u>1162-38</u>	
Dated <u>9-1-28</u>	<u>18/9</u>

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*Proceedings of the Madras Government, Public Works Department,
9th April 1869.*

No. 235. Read the following letter from the Consulting Engineer for Irrigation and Canal Company, to the Secretary to Government, Public Works Department, dated Madras, 3rd March 1869, No. 122 :—

- 21 Plans.
22 Estimates.
2 Letters, in original, from Agent.

1. In their Order of the 22nd November 1867, No. 3,611, the Government reviewed the revised masonry estimates of the 7th Section, Main Canal,

and, considering the explanations given regarding the expenditure incurred prior to the 31st May 1865 to be insufficient, retrenched Rupees 33,910. Some of the designs for the works were likewise considered to need revision, but, with a few exceptions, permission was given for going on with the works, pending the sub-

mission of a revised estimate with the necessary explanatory information. A revised estimate has now been forwarded,

and I have the honour to submit the following remarks upon it.

2. The delay in the submission of these estimates is referred to in the last paragraph of the Chief Engineer's letter, and is explained to be due to a misunderstanding of paragraph 29 of the letter from this Office, the recommendations contained in which the Government approved and directed to be carried out.

3. The total of the estimate now submitted is Rupees 3,59,179-10-0, and as the existing sanctions, detailed at the end of the abstract estimate, amount to Rupees 1,30,179-10-0, the supplemental sanction asked for by the Chief Engineer is Rupees 2,29,000.

4. As some changes have been made in the works, I subjoin a table of those in the present estimate and in that of 1867, with the cost of each :—

Description.	Estimated cost in		
	1867.	1869.	
	RS.	RS.	
Jootoor Aicut and Head Works...	70,420	54,830	
Regulating Lock	12,110	33,010	
Bridge No. 1	9,662	14,210	
Culvert, 3 feet	* 728	† 840	* Expended up to June 1867.
Do. 10 feet	* 370	† 430	† Do. do. Oct. 1868, and works abandoned.
Do. 3 of 10 feet	* 6,465	† 7,550	* Expended up to June 1867
			† Do. do. October 1868 } Work abandoned.
Do. 2 of 10 feet	1,223	2,740	Culvert abandoned.
Waste Weir 3-5 feet openings	1,221		
Bridge, second class	7,590	8,630	
Culvert	441	2,410	Culvert abandoned.
Waste Weir 4-5 feet openings	1,080		
Culvert 1 of 8 feet	3,732		
Do. 2 of 5		2,905	
Waste Weir	22,720	10,570	
Culvert 1-8 feet vent	3,743		
Do. 2-5		2,850	
Do. 1 of 8 feet	6,263		Vide Rupees 4,250 of 1869, below.
Ferry boat	660		
Bridge, 2nd class		7,410	In lieu of ferry.
Culvert, 1 vent, 8 feet		4,250	

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Description.	Estimated cost in		
	1867.	1869.	
	RS.	RS.	
Waste Weir	14,323	16,050	
Bridge, 2nd class		7,190	Additional.
Culvert 2 of 20	17,795	15,610	
Do. 2 of 5		2,830	Additional.
Do. 1 of 3	1,918	1,860	
Bridge, 3rd class		5,620	In lieu of ferry. Entered lower down in estimate of 1867.
Ferry	660		
Culvert 1 of 3	1,844	1,620	
Do. 1 of 8	4,310	1,590	Abandoned. Catch water drain substituted.
Do. do.	3,708	140	Do. do.
Do. 1 of 10	6,377	...	
Do. 6 of 5		10,170	
Bridge, 2nd class	7,590	7,830	
Do. 3rd do.	2,440		
Culvert	368		Abandoned. Old expenditure in estimate of 1869 appears to be included in Bridge, 2nd class. Rupees 7,830.
Ferry boat	660		Superseded by bridge.
Culvert 1 of 10	5,450		
Do. 4 of 5		6,520	
Do. 1 of 10	6,046	1,380	Abandoned and drainage diverted. In 1867 the expenditure incurred was stated to be Rs. 1,494-3-6.
Aqueduct 5 of 10	* 18,571	13,070	* Including Rupees 381 on old Culvert No. 22.
Bridge, 2nd class		7,410	Additional.
Aqueduct 15 of 10	† 38,760		Including Rupees 60 spent up to June 1867, Nundial Tank, Main Channel.
Do. 22 of 10		32,010	
Culvert 3 of 8	16,489	14,400	
Stanch	2,400		Not required.
Culvert 10 of 3	10,690		
Do. 6 of 5		6,110	
Bridge, 1st class	14,380	13,000	
Culvert 1 of 8	5,766	2,570	
Bridge, 3rd class		5,620	Additional.
Culvert 4 of 8	11,447	6,370	
Bridge, 2nd class		7,410	Additional.
Culvert 2 of 8	8,040	4,140	
Do. 1 of 3		210	Abandoned.
Bridge, 1st class	* 7,590	† 6,880	* Designed for 2nd class. † Do. for 1st do.
	3,55,450	3,47,340	

This statement shows an apparent decrease of Rupees 8,110, but the actual decrease is much more, the following deductions requiring to be made in order to afford a fair comparison:—

1. Difference between estimates for regulating lock, the sum entered in 1867 being a transcript from the original estimate and altogether inadequate...	Rs. 20,900
Difference between Bridge, 2nd class and Ferry	Rs. 7,410 660
	6,750

	RS.
Bridge, 2nd class (additional)	7,190
Culvert two vents of 5 feet (additional)	2,830
Difference between Bridge, 2nd class... and Ferry	Rs. 7,410 660
	6,750
Bridge 3rd class (additional)	5,620
Do. 2nd do. (do.)	7,410
Difference between totals of the two years	8,110
	65,560

Deduct.

Saving on abandonment of a culvert of one vent of 8 feet and substituting a catch-water drain	Rs. 2,720
Do. do. on another culvert	3,568
Do. do. on one of one vent of 10 feet	4,666
Do. do. on stanch not required	2,400
	13,354
	52,206

So that the decrease on works included in both estimates is rather more than half a lac.

Jootoor Anicut and Head Works.

5. The Chief Engineer has decided to give up the idea of constructing an oblique anicut, and the plan now forwarded shows a direct anicut on the original line with its crest 10.53 feet above under-sluice sill, and the wings 21.53 above the same level. Mr. Latham has concluded, after enquiry, that this level for the wings will be sufficiently high. In Mr. Ross's letter, * to which the Chief Engineer refers, the highest flood mark pointed out by the villagers is stated to be 14.67 feet above head-sluice sill, and this is equal to 17.67 feet above under-sluice sill, so that the margin allowed is 21.53 — 17.67 = 3.86, and as the anicut was at the time of that fresh not more than half its full height, it would seem that this margin is hardly sufficient for safety. On the other hand, however, it must be mentioned that the length of the anicut is much greater than the former width of the river, the right bank of which has been lowered several feet, and the water-way, therefore, can hardly be compared with that existing in 1865. It would have been preferable, I think, had the sufficiency of the arrangements, as now designed, been more clearly demonstrated, but as this has not been done, and as I have not the data for making a calculation myself, I can only recommend the sanction of Mr. Latham's proposals on his responsibility: for the works are far advanced, and whatever may be found advisable in the future, there is hardly an alternative to completing them for the present according to the designs submitted. The way in which the anicut coping is to be secured is shown on the anicut plan. It is a modification of an arrangement suggested by me, and I think it will prove efficient.

The overfall from the anicut is to be received on a water cushion five and a half feet in depth, and this will probably be sufficient. It is hardly likely, however, that

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the thin flags of the flooring of the cushion will remain in position, and the top of retaining wall should be finished off with a curve on the edge next the cushion, and for this part large stone should be used. The bed of the river is shale, which, unaided, is not compact enough to stand the overfall, but which did not receive any such injury as to make the ancient wall insecure during the three or four years that water has passed over the unfinished weir. The retaining wall under the rear face of the body of the ancient, cross-section K. L., looks very unsubstantial, and will run some risk of being blown out. I believe this part of the work has been already completed.

General Plan of Head Works.

The general plan of the head works will afford a clear idea of their general arrangement. It shows the proposed position of the regulating lock, and of the navigation entrance to the canal from the Cauzee. The navigation was originally intended to enter the vagu close to the under-slucies, and to use that channel up to the place where the excavation for the lock was formerly partly made. The present arrangements are, I think, as good as they can be made.

Regulating Lock.

6. The estimate, Rupees 33,010, for this work appears very large, but it includes Rupees 13,563 for the navigation channels above and below it and Rupees 2,140 expenditure on old site, of which latter work to the value if not more than about one-seventh has been done, and that will form part of the channel. I hope the earthworks will be executed for much less than the sum named in the estimate.

Waste Weir (Calingulah) No. 6.

Letter, paragraph 16.

7. This work was formerly estimated to cost Rupees 22,720, the present estimate is Rupees 10,570. It was noticed in sending up the estimates of 1867, and the revised design appears to me to be quite as efficient as, if not more so than, the more expensive arrangement. The weir itself should seldom discharge water, as the sluices will be more than sufficient. No rubble apron is shown below the retaining wall at the outer end of the packed apron of the sluices, but it will be advisable to allow one similar to that shown on the section at C. D., for it is more necessary for the sluices than for the rest of the work.

Waste Weir (Calingulah) No. 9.

Unless there be compact kunkur at the site of this work, at a level but little below the top of the retaining wall of the water-cushion, a rough stone apron outside this wall for a width of four or five yards will be required, and similarly a dry stone apron opposite the sluices, outside the retaining wall, will be necessary. The apron inside the latter retaining wall is not, as drawn in cross-section A. B., such as would be likely to stand. In addition to this weir a set of four sluices is intended to be placed in the vagu near the weir. A plan of this has been submitted, as also a plan showing its position with reference to the weir.

8. In paragraph 4 of his letter the Chief Engineer notices that, in commenting on the designs for the masonry works of the 1867 estimate, I pointed out that four feet abutments were not necessary for culverts of eight feet span, but that when recently inspecting the canal I mentioned to the Executive Engineer in charge that his abutments, which are two and a half feet thick, the dimension suggested by myself, were too thin. Mr. Latham has, however, overlooked the essential

difference of the conditions referred to on the two occasions. The designs of 1867 allowed a rise of two and a half feet, the culverts I saw under construction have a rise of one foot, and I think, therefore, that I was right in expressing different opinions on the two occasions, the thrust in the latter case being about four times as great as that in the former.

9. It appears to be unnecessary, under present circumstances, that I should criticize in detail the plans of all the minor masonry works included in the present estimate. The principal defect of the culverts lies in the flatness of the arches of many of them, which will entail the use of thicker abutment walls if they are to be made secure, and the Chief Engineer has already given instructions upon this point.

Nundial Tank Channel Aqueducts—

One of twenty-two arches of ten feet.

One of five do. do.

* Letter No. 114, of the 10th instant, paragraph 17.

† Paragraph 13 of letter printed in Proceedings Madras Government of the 22nd November 1867.

‡ Yards 5,172.

§ Yards 5,172.

would be liable to be increased to four miles an hour. I cannot, therefore, recommend the sanction of these aqueducts, and the larger one, notwithstanding the expense of re-construction, should be widened to the full width of forty-five feet between the side walls.

11. Provision has been made in this estimate for all the additional bridges which were considered to be necessary, and which were included in the complete

Paragraph 24, Proceedings Madras Government, 17th November 1868, No. 3,586.

Paragraph 28, Proceedings Madras Government, 22nd November 1867, No. 3,611.

list of crossing given in the report marginally noted.

All the bridges, with the exception of that commenced some years ago at Ayalore, will have two arches of thirty feet span each.

The Ayalore bridge revised design shows that it is intended to convert the skew into a square bridge. As this arrangement has been submitted by the Chief Engineer in preference to the plan

of constructing the skew arches in echelon, I beg to recommend its sanction.

12. The Chief Engineer has added Rupees 11,839-10-0 to the estimate to cover the cost of stores and store charges, on the ground that he has "no data upon which to arrive at the probable apportioning of these charges." The amount is not a large one, but it is five per cent. on the work, and there is an allowance in the body of the estimate of ten per cent. for contingencies. Moreover, the reason given for making this a separate charge is not really of any value, for the stores are obtained for some part of the work and should be paid for out of the estimate rates for that work, and store charges are simply a per-centage upon the value of the stores. If the Executive Engineer buys materials on the spot, he charges them at once to the work, and materials obtained from Madras or from some other dépôt

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under the general name of Stores should be similarly treated. An allowance for General Plant is admissible, but one for Stores should not, for the future, be allowed to be shown in an estimate.

13. The rates for rubble and arch work masonry are in some cases a little high and the Chief Engineer (paragraph 6) alludes to this, and states that although the cost of the former work has not yet exceeded $4\frac{1}{2}$ Rupees, the progress made had been insufficient to prove whether this rate would every where be sufficient. I hope the Executive Engineer will be able to complete his works considerably within the estimate.

14. The papers which accompany these estimates really throw very little light upon the great difference* between the expenditure prior to 1865, and the value of the work done. Regarding a few of the works there is some explanation contained in Mr. Ross's letter,† but these were the works particularly named by me as those which from personal recollection I thought had not been correctly measured, and the result of the re-examination shows that the supposition was correct.

* E. g., vide Estimate for completion of Jootoor Anicut and Head Works.
Value of work done at present Estimate rates Rs. 12,940
Expenditure 31,170

† Agent's No. 40.

It is very clear that there was great mismanagement of the 7th Section prior to the cessation of work, and no doubt the investigations which have been required will have had a beneficial effect in attracting attention to the want of proper care exhibited.

As it would seem that no further explanations are likely to be forthcoming, and as in the case of the 3rd Section, Government considered it unnecessary to enforce a retrenchment, I would suggest that the past expenditure on the 7th Section be admitted to the accounts.

15. I beg also to recommend that these revised estimates with the exception of the two aqueducts referred to in paragraph 10 above, be sanctioned, and that the Chief Engineer be requested to submit designs and estimates for these with a clear canal water-way of forty-five feet.

The amount to be sanctioned will then be—		RS.
Amount of Estimate	...	2,29,000
Smaller Aqueducts	Rs. 13,070	
Larger do.	" 32,040	
		45,110
Supplemental sanction now required	...	1,83,890

P. S.—There are mistakes in the Estimates, as shown in pencil, which would require an increase of 1,698 Rupees; but, as contingencies have been allowed for at the rate of ten per cent., and as the errors amount to less than one per cent. on the value, Rupees 2,29,125, of the work remaining to be done, I have not thought it necessary to make any change in the totals of the estimates.

From the Assistant to Chief Engineer, to the Agent and Manager of the Madras Irrigation and Canal Company, dated Kurnool, 24th April 1868, No. 77.

With reference to Captain Mullins' No. 11, of 7th instant, forwarded with your endorsement No. 22, of 17th instant, I have the honour to hand you copy of answer to Memorandum of queries addressed to the Executive Engineer, Nundial Division, and granted in G. O. No. 3,611, of 22nd November, as an accompaniment to the Chief Engineer's letter No. 732, of 9th October 1867.

Drawings of the works requiring revision are in course of preparation, (viz., the 2nd Class Bridges, Calingulabs, Drawings 6 and 9). A revised drawing* and estimate to replace No. 27 I had the honour to forward already, as we wish to begin that work at once.

With regard to the anicut, I conclude that our design, as submitted, may generally be allowed to stand, as the information we have now obtained, with regard to flood level in the main, tends to support our former data upon which the design was based. The west wings will need raising, and an amended design of this part with a supplemental estimate will be submitted.

From L. E. ROSS, Esq., Executive Engineer, Nundial Division, to the Chief Engineer of the Madras Irrigation and Canal Company, dated Ayalore, 1st April 1868, No. 346.

I have the honour to subjoin answers to the queries of the Consulting Engineer with reference to revised masonry estimates of this Division, forwarded with your 235, of 12th October last, to Mr. Perkes.

1st.—Highest known flood at Jootoor.—The only neighbouring village which abuts on the river is Jootoor, close to the anicut. On the 27th November 1867, I made a careful investigation regarding the highest known flood.

First, the Kurnum and Reddy were questioned as to the height the river rose to on the village bandy road, on the side nearest the anicut, and indicated a spot, which I shall call A.

Second, a ryot, whose vegetable garden came down at an angle on this road, further up the river, stated that in the highest flood he had known, there was barely room to pass between the water and his fence. This point I call B. Further up, on the bank used by the women in drawing water, the Kurnum and villagers showed me a point which I shall call C. And again further on, on the open bank of the river, where it is steeper and more irregular, a point (D) was shown by a talkative old lady, supposed to be the "oldest inhabitant," and who had lived in a hut alongside for a considerable number of years.

On the same day these points were carefully levelled by Mr. Frericks and were afterwards checked by Surveyor Partridge, and their relative value found as follows:—

Datum (Head Sluice Cill 193.58 below Hindry datum)	...	0.00
Present top of Head Sluice	...	14.00
Top of Head Sluice as shown in revised plan	...	18.50
Point A	...	14.67
" B	...	14.05
" C	...	13.35
" D	...	11.45

2nd.—Work done, Jootoor Anicut.—I am quite unable to say how the 101 cubic yards has been arrived at, nor was Mr. Perkes able to give me any information on the subject. The field book of measurements of Mr. Smart contains a sheet signed by that gentleman, and dated 3rd May 1867, showing quantity of work done at Jootoor, but this sheet gives the same figures as Mr. Perkes, of 17th July 1867, to you. As this question was one of decided complexity, I thought the safest way was to make my investigation completely independent and now beg to hand you detailed measurement of the work already done towards Jootoor Anicut, with my estimate of its cost.

I have divided the work into two classes, viz., common rubble and dressed stone, and I think that this is all that is necessary; the quoins, cut waters, and arch stones having received very little

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more dressing than the facing of head and under-sluice walls. I have taken these walls as dressed back for a depth of eighteen inches.

3rd.—*Excavation, Jootoor Anicut.*—It is almost impossible to give a measurement of the excavation done, but I have checked the quantity given by Mr. Smart as well as I could, and conclude that the 7,000 cubic yards includes the entrance channel, the measurement of which is 532 cubic yards.

4th. *Head Sluice Arch Work.*—The whole of the arch work is finished, and amounts to 10 cubic yards as shown in my measurement attached.

5th. *Calingulah 2.*—The statement is incorrect. There are 473.83 cubic yards of masonry finished, 750 cubic yards of excavation, and 24.87 cubic yards silt to be removed, and 10 cubic yards of sand on the ground.

6th. *Culvert 11.*—There are 89.16 cubic yards of masonry done, and 1.50 cubic yards silt to be removed. The measurement of the work done here has been got at considerable expense.

No. 40.

COMMUNICATED with reference to the Consulting Engineer's letter No. 11 of 7th April 1868.
(Signed) F. H. HENSLOWE.

MADRAS.

Agent and Manager.

30th April 1868.

From the Agent and Manager of the Madras Irrigation and Canal Company, to the Consulting Engineer for Irrigation and Canal Company, dated Madras, 18th February 1869, No. 421.

1. I have the honour to forward, herewith, revised plans and estimates, as per accompanying list, for the masonry works of the 7th section, with copy of the Chief Engineer's letter, dated 15th February 1869, and request you will be good enough to obtain the early sanction of Government for the expenditure therein proposed.

2. The letter from Mr. Ross, referred to in paragraph 3 of the Chief Engineer's letter, was communicated to you with my No. 40 of 30th April 1868.

3. The enclosure alluded to in paragraph 7 has been called for, and shall be forwarded to you immediately on receipt.

From the Chief Engineer, to the Agent and Manager of the Madras Irrigation and Canal Company, dated Idemaddaka, 18th February 1869.

Revised 7th Section, Masonry.

1. In reference to G. O. No. 3,611, of 22nd November 1867, I have the honour to submit a re-adjusted revised estimate, amounting to Rupees 2,29,000, for the masonry works of the 7th Section. The sum included for Agent's charges for stores and store charges, I have placed as a separate item for sanction, though these charges are carried from month to month to the debit of particular works, because I have no data upon which to arrive at the probable apportioning of these charges.

2. The quantities of useful work found done is stated in the beginning of each estimate except in culvert eight, where no charge is made in the estimate. No fresh information can be found to explain the disproportion between the quantity of work found and that would naturally be expected from the amount spent; certainly my experience of works will not permit me to price them fairly higher than the prices at Jupaal and Turrigopully, and the prices there paid must suffice to account for the expenditure in the 7th Section when applied to the quantity of work found to be actually executed, though these prices are likely to be nearer the true cost than the prices at which work was generally executed in the adjacent 6th and 8th Sections. Consulting Engineer's letter to Secretary to Government, Department Public Works, No. 97 of 15th 67, paragraph 6. In the estimates of the three bridges Nos. 3, 16, and 27, of which the first is in the ninety-third mile in my copy, the only mention of string courses is in the following item: "3.4 running feet, string course, at Annas 3, Rupees 62-10-0;" perhaps the 3 Annas has been entered in the wrong column in the copy sent the Consulting Engineer, but the amount would show them to be Annas not Rupees.

3. *Paragraph 7, Anicut.*—I have considered that the highest flood level was settled by Mr. Ross's No. 3 of 1st April 1868, sent to you, as agreeing with that submitted by me. I have now

carried the anicut on the original site, with the modifications in the coping recommended by Captain Mullins, in order to save delay and avoid all confusion in afterwards settling the site for the lock.

4. The working drawings of the culverts have been made, and are those now submitted. By increasing the aggregate span and decreasing the depth of each culvert and some alteration of sites, I have obtained a system larger in area of waterway, less buried in the ground, and cheaper than those previously sanctioned. In accordance with Captain Mullins's recommendation in paragraph 16, Mr. Ross has hitherto constructed the eight feet culvert with abutments 2 feet 6 inches, instead of 4 feet. This Captain Mullins, on his latest inspection, considered to be too light; and 3 feet thick with counterforts (averaging 4 feet thick in the average) will doubtless prove safe and not very extravagant. The modifications of the calingulahs from the sanctioned designs will, I hope, meet Captain Mullins's approval, as also the arrangements for Byupgoodoor tank. Nundial tank has been provided for already.

5. The new bridges, with increased spans as ordered for the rest, are included in the present estimate.

6. The rates for masonry have never yet exceeded Rupees 4-8-0 for rubble work. The progress hitherto, however, has not been sufficient to enable me to say that that rate was wisely prescribed as a limit.

7. Mr. Ross's letter gives all the available information on the points referred to by Captain Mullins.

8. I regret that the wording of the G. O. No. 3,611, of 22nd November 1867, paragraph 4, "Approving" of Captain Mullins's recommendations in paragraph 29, was misunderstood by me to "authorize me to proceed" with the anicut and other works mentioned in that paragraph, in the sense of authorizing the expenditure necessary to carry them on. It was only last autumn that I was assured that he did not sanction the expenditure of money required to complete the authorized work. Meantime I had the working drawing of all the works nearly ready to get the whole into form for submission in sufficient detail. This I have accordingly done. It is, however, now of great importance to get the approval of these plans, and also the permission to draw the money necessary for them as early as possible.

List of Revised Plans and Estimates of (7th Section) Masonry Works.

Description of Plans.	Estimates.
General Plans of Head Works.	Abstract Supplemental Estimate.
Jootoor Anicut.	Comparative Statement.
Regulating Locks.	Nundial Estimate No. 1.
Calingulah No. 2.	Do. No. 1 A.
Do. " 4.	Do. " 2.
Culvert " 4 and 7.	Do. " 3-7 A 16-19a 25a.
Calingulah " 6.	Do. Estimate No. 4.
Do. " 9.	Do. " 5-7-10 A.
Detached emptying sluice.	Do. " 6.
Plan of Pothala Vagoo.	Do. " 8-24.
Culvert 2 openings 20 feet.	Do. " 9.
Do. 1 do. 3 do.	Do. " 10.
Aqueduct Nos. 19 and 20.	Do. " 11-12.
Plan showing position of—	Do. " 11 A 21 A.
Aqueduct No. 20.	Do. " 15-22.
Culvert 3 openings 8 feet.	Do. " 17.
Plan alteration of Ayaloro bridge.	Do. " 19.
Culvert No. 24.	Do. " 20.
Do. " 25.	Do. " 21.
Do. " 26.	Do. " 23.
2nd and 3rd class Bridges.	Do. " 25.
5 Feet Culverts, general plans.	Do. " 26.

(True Copies.)

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

Do misund. understanding of para 29 of the letter

*Proceedings of the Madras Government, Public Works Department,
9th April 1869.*

No. 236.

ORDER THEREON, 9th April 1869, No. 1,162.

IRRIGATION, No. 8.

1. With this letter the Consulting Engineer for the Madras Irrigation and Canal Company submits masonry estimates, for the 7th Section of the Company's Main Canal, which have been revised with reference to the Order of Government of the 22nd November 1867, No. 3,611, in which sanction for the estimates, at that time submitted, and amounting to Rupees 3,55,450 was withheld; and, while permission was granted for the construction of many of the works, the Consulting Engineer was directed to place himself in communication with the Chief Engineer, with a view to the alteration of the designs of some of the works, and to the preparation of more reliable estimates. The Government also declined to admit an overcharge of Rupees 33,910 without full and sufficient explanations.

2. The estimates now received amount to Rupees 3,59,179-10-0, and they are somewhat in excess therefore of those prepared two years ago. Captain Mullins shows, however, that the present estimates include many additional works, and that, if the works included in both estimates be compared, there is a difference of rather more than half a lac in favour of those of this year.

3. With regard to the overcharges, the Consulting Engineer reports that the papers accompanying the estimates throw but little light upon the great difference between the expenditure prior to 1865, and the value of the work done; but, as there is little likelihood of any further explanations being obtainable, he recommends that the excess expenditure should be passed. From recent reports the Government have learnt that the arrangements under which the canal works are now being carried on are far more satisfactory than they were formerly, and they accord therefore to Captain Mullins' recommendation, and grant permission for the removal of the retrenchment of Rupees 33,910.

4. The Consulting Engineer also recommends the sanction of the revised estimates, with the exception of that part of them amounting to Rupees 45,110, which provides for two aqueducts, intended to carry the canal across the supplying channels of the Nundial tank. These aqueducts have been designed with a canal water-way of only thirty feet in width, although in Captain Mullins' letter, transmitting the estimates of 1867, and a copy of which was communicated to the Agent, it was pointed out that the proper width would be forty-five feet. The Chief Engineer has given no explanation as to his reasons for adopting a design against the sufficiency of which strong grounds had been advanced; and, as the Right Honorable the Governor in Council concurs with the Consulting Engineer in considering that the velocity of three miles an hour, which, it has been shown, would be necessary to pass the full supply of the canal, would be extremely objectionable on a first class canal of navigation, he must withhold sanction to the designs as submitted, and they should be revised so as to provide a clear width of forty-five feet. His Excellency regrets that, owing to the commencement of one of these aqueduct in anticipation of the approval of the design, there will be some delay and also loss of money occasioned by the change; but, so far as he can judge, neither the Government nor the Consulting Engineer are in any way responsible for the results.

*Proceedings of the Madras Government, Public Works Department,
9th April 1869.*

5. Deducting the estimated cost of the aqueducts, the supplemental sanction required is for Rupees 1,83,890, and this is accordingly granted.

(True Extract.)

Colonel, R. E.,

Secretary to Government.

To the Consulting Engineer for Irrigation and Canal Company.

„ Manager for

do.

do.

Chief Engineer's letter, and is explained to be due to a misapprehension of para 29 of the letter.

Consulting Engineer's Office
Irrigation Canal Company
Madras, 3rd March 1864.

N^o 122

Sir,

Captain, S. Mullins, M.C.

Courtesy for S.C. Co.

Sir,

The Secretary to Government

Department of Public Works.

Sir,

In their order of the 22nd November 1863 N^o 3611, the Government reviewed the revised Masonry Estimates of the 1st section Main Canal and, considering the explanations given regarding the expenditure incurred prior to the 31st May 1863 to be insufficient retrenched Rs. 3910. Some of the designs for the works were likewise considered to need revision, but, with a few exceptions, permission was given for going on with the works, pending the submission of a revised estimate with the necessary explanatory information. A revised estimate has now been forwarded and I have the honor to submit the following remarks upon it.

2. The delay in the submission of these estimates is referred to in the last para of the Chief Engineer's letter, and is explained to be due to a misapprehension of para 29 of the letter from the

Refer to letter N^o 424
of the 18th inst. with
Chief Engr's of the 13th do

Exd. S. T. Augustin.

This office, the recommendations contained in which the Government approved and directed to be carried out.

3. The total of the estimate now submitted is Rupees 359,179-10-0 and as the existing sanctions detailed at the end of the Abstract estimate amount to Rupees 130,179-10-0, the supplemental sanction asked for by the Chief Engineer is Rupees 2,29,000.

4. As some changes have been made in the works, I subjoin a table of those in the present estimate and in that of 1867 with the cost of each.

Description	Estimated cost in 1867	1869
Lock or Ancient Head works	70,420	54,830
Regulating Lock	12,110	33,010
Bridge No. 1	9,662	11,210
Culvert 3 feet	728	840
do 10 "	370	430
do 3 of 10 feet	6,465	7,550
do 2 of 10 "	1,223	
Waste weir 3-5 openings	12,215	27,40
Bridge 2 nd Class	7,590	8,630
Culvert	441	
Waste weir 4-5 feet openings	10,80	24,40
Culvert 1 of 8 feet	3,732	
do 2 of 8 "		2,905
Waste weir	22,720	10,570
Culvert 1-8 feet vent	3,743	
do 2-5 "		2,855
do 1 of 8 feet	6,263	
Ferry boat	660	
Bridge 2 nd Class	7,410	
Culvert 1 vent 8 feet		4,250
Waste weir	14,323	16,050
Bridge 2 nd Class	7,190	Additional.

Vide No. 4250 of 1869 below.

Description	1867	1869
Culvert 2 of 20	17,795	15,640
do 2 of 5		2,830 Additional
do 1 of 3	1918	1,860
Bridge 3 rd Class		5,620 In lieu of ferry - entered lower down in Estimate of 1867.
Ferry	660	
Culvert 1 of 3	18,44	16,20
do 1 of 8	4,310	15,90 Abandoned - C&K water drain substituted
do do	3,708	140 do do
do 1 of 10	6,377	
do 6 of 5		10,170
Bridge 2 nd Class	7,590	7,830
do 3 rd do	2,440	
Culvert	368	Abandoned - old expenditure in Estimate of 1869 appears to be included in Bridge 2 nd Class Rs. 7,830.
Ferry boat	660	Superseded by bridge.
Culvert 1 of 10	5,450	
do 4 of 5		6,520
do 1 of 10	6,046	13,80 Abandoned and Drainage diverted. In 1867 the expenditure incurred was stated to be Rs. 14,94.3.6
Aqueduct 5 of 10	18,571	13,070 Including Rs. 381 on old culvert No. 22.
Bridge 2 nd Class		7,410 Additional.
Aqueduct 15 of 10	38,760	Including Rs. 60 spent up to June 1867 on Main Channel.
do 22 of 10		32,040
Culvert 3 of 8	16,489	14,400
Stanch	2,400	Not required.
Culvert 10 of 3		10,090
do 6 of 5		6,110
Bridge 1 st Class	14,380	13,000
Culvert 1 of 8	5,766	2,570
Bridge 3 rd Class		5,620 Additional.
Culvert 4 of 8	11,447	6,370
Bridge 2 nd Class		7,410 Additional.
Culvert 2 of 8	8,040	4,140
do 1 of 3		210 Abandoned.
Bridge 1 st Class	7,590	6,880 Designed for 2 nd Class.
		do for 1 st do
		35,545 34,734

This statement shows an apparent decrease of Rupees 8,110 but the actual decrease is much more, the following Deductions

deductions requiring to be made in order to afford a fair comparison.

1. Difference between estimates for Regulating Vents, the sum entered in 1867 being a Transcript from the original estimate and altogether inadequate Rs 20900

Difference between Bridge 2nd Class 7410 and Ferry 660 1750

Bridge 2nd Class (additional) 7190

Culvert 2 vents of 8 feet (additional) 2130

Difference between Bridge 2nd Class 7410 and Ferry 660 1750

Bridge 3rd Class (additional) 3620

Do 2nd do do 7410

Difference between Totals of the 2 years 1110 68560

Reduct.

Saving on abandonment of a culvert of 1 vent of 8 feet and substituting a Catch water drain Rs 2720

Do Do on another culvert 3860

Do Do on one of 1 vent of 10 feet 4666

Do Do on Stanch, not required 2400

13854

32206

That the decrease on works included in both estimates is rather more than half a lac.

5. The Chief Engineer has decided to give up the idea of constructing an oblique Ancient, and the plan now forwarded shows a direct Ancient on the original line with its crest 10.53 feet above under sluice sill, and the wings 21.53 above the same level. Mr. Vatham has concluded, after enquiry, that this level for the wings will be sufficiently high. In Mr. Rossi's letter to which the Chief Engineer refers, para 3.

Enclosed, attached to Ch. Eng. 21 April 1868

The highest flood mark pointed out by the villagers is stated to be 14.67 feet above under sluice sill and this is equal to 17.67 feet above under sluice sill, so that the margin allowed is $21.53 - 17.67 = 3.86$ and as the Ancient was at the time of that fresh not more than half its full height, it would seem that this margin is hardly sufficient for safety. On the other hand however, it must be mentioned that the length of the Ancient is much greater than the former, width of the river the right bank of which has been lowered several feet, and the waterway therefore can hardly be compared with that existing in 1865. It would have been preferable, I think, had the sufficiency of the arrangements, as now designed, been more clearly demonstrated, but as this has not been done, and as I have not the data for making a calculation myself, I can only recommend the sanction of Mr. Vatham's proposals on his responsibility, for the works are far advanced, and whatever may be found advisable in the future, there is hardly an alternative to completing them for the present according to the designs submitted.

The way in which the Ancient coping is to be secured is shown on the Ancient plan. It is a modification of an arrangement suggested by me, and I think it will prove efficient. The overfall from the Ancient is to be received on a water cushion 5 1/2 feet in depth and this will probably be

be sufficient. It is hardly likely, however, that the thin flags of the flooring of the cushion will remain in position, and the top of retaining wall should be finished off with a curve on the edge next the cushion, and for this part large stone should be used. The bed of the river is shale, which, unaided, is not compact enough to stand the overfall, but which did not receive any such injury as to make the Ancient wall insecure during the 30 or 40 years that water has passed over the unfinished weir. The retaining wall under the rear face of the body of the Ancient, Cross section B. D., looks very unsubstantial, and will run some risk of being blown out. I believe this part of the work has been already completed.

The General Plan of the Head works will afford a clear idea of their general arrangement. It shows the proposed position of the Regulating Lock, and of the Navigation Entrance to the Canal from the Canals. The navigation was originally intended to enter the reach close to the under sluices, and to use that channel up to the place where the excavation for the lock was formerly partly made. The present arrangements are, I think, as good as they can be made.

The Estimate, Rupees 33,010, for this work appears very large, but it includes Rupees 13,563 for the Navigation channels above and below it and

Regulating Lock.

Rupees

Waste weir (Palingulak)
No. 6.

Letter para. 16.

Rupees 2,140 expenditure on old site, of which latter work to the value if not more than about 1/2 has been done, and that will form part of the channel. I hope the earthworks will be executed for much less than the sum named in the estimate.

This work was formerly estimated to cost Rupees 22,720, the present estimate is Rupees 10,570. ~~It~~^{It} was noticed in sending up the estimates of 1867, and the revised design appears to me to be quite as efficient, if not more so than, the more expensive arrangement. The weir itself should seldom discharge water, as the sluices will be more than sufficient. No rubble apron is shown below the retaining wall at the outer end of the packed apron of the sluices, but it will be advisable to allow one similar to that shown on the Section at C. D., for it is more necessary for the sluices than for the rest of the work.

Waste weir (Palingulak)
No. 4.

Unless there be compact thrusts at the site of this work, at a level but little below the top of the retaining wall of the water cushion, a rough stone apron outside this wall for a width of 4 or 5 yards will be required, and similarly a dry stone apron opposite the sluices, outside the retaining wall, will be necessary. The apron inside the latter retaining wall is not, as drawn in Cross Section A. B., such as would be likely to stand. In addition to this weir a set of 4 sluices is intended to be placed in the reach near the weir. A plan of this

has been submitted - as also a plan showing its position with reference to the weir.

In para: 4 of his letter the Chief Engineer notices that, in commenting on the designs for the Masonry works of the 1867 estimate, I pointed out that 1 1/2 feet abutments were not necessary for culverts of 8 feet span, but that when recently inspecting the Canal I mentioned to the Executive Engineer in charge that his abutments, which are 2 1/2 feet thick, the dimension suggested by myself, were too thin. Mr. Vatharn has however overlooked the essential difference of the conditions referred to on the two occasions. The designs of 1867 allowed a rise of 2 1/2 feet, the culverts I saw under construction have a rise of 1 foot, and I think therefore that I was right in expressing different opinions on the two occasions, the thrust in the latter case being about 4 times as great as that in the former.

It appears to be unnecessary under present circumstances that I should criticize in detail the plans of all the minor masonry works included in the present estimate. - The principal defect of the culverts lies in the flatness of the arches of many of them, which will entail the use of thicker abutment walls if they are to be made secure and the Chief Engineer has already given instructions upon this point.

I have already reported that the larger of these Kundial Tank Channel Aqueducts has been partly constructed with a width of Canal water way of only 30 feet instead of 45 feet.

Kundial Tank Channel Aqueduct
1 of 22 arches of 10 feet
span
para: 17 -

para: 16 of letter printed in P.M. of the 22 Nov 1867.

* yards 5173.

para: 24 - P.M. of 17 Nov 1868 P.M. 3586.

para: 28 - P.M. of 22 Nov 1867 P.M. 3611.

para: 22 - P.M. of 17 Nov 1868 P.M. 3586.

The minimum width admissible. - The mistake is one of great importance for the mean width of the Canal is 60 to 62 feet, and the effect would be to produce a velocity of nearly 3 miles an hour which, with a boat of 15 feet beam and 3 feet draught of water, going up the Canal, would be liable to be increased to 4 miles an hour. - I cannot therefore recommend the sanction of these Aqueducts, and the larger one, notwithstanding the expense of reconstruction, should be widened to the full width of 45 feet between the side walls.

11. Provision has been made in this estimate for all the additional bridges which were considered to be necessary, and which were included in the complete list of crossings given in the report marginally noted.

All the bridges with the exception of that commenced some years ago at Ayalore will have 2 arches of 30 feet span each.

The Ayalore Bridge revised design shows that it is intended to convert the skew into a square bridge. - As this arrangement has been submitted by the Chief Engineer in preference to the plan of constructing the skew arches in echelon I beg to recommend its sanction.

12. The Chief Engineer has added Rupees 11,839-10-0 to the estimate to cover the cost of Stores and Store charges on the ground that he has "no" data upon which to arrive at the probable apportioning.

"apportioning of these charges." The amount is not a large one, but it is 5 per cent on the work, and there is an allowance in the body of the estimate of 10 per cent for contingencies. Moreover the reason given for making this a separate charge is not really of any value, for the Stores are obtained for some part of the work and should be paid for out of the estimate - rates for that work, and Store charges are simply a percentage upon the value of the stores. If the Executive Engineer buys materials on the spot he charges them at once to the work, and materials obtained from Madras or from some other Depot under the general name of Stores should be similarly treated. An allowance for General Plant is admissible, but one for Stores should not for the future be allowed - to be shown in one estimate.

13. The rates for rubble and archwork masonry are in some cases a little high, and the Chief Engineer (para. 6) alludes to this and states that although the cost of the former work has not yet exceeded 40 Rupees, the progress made had been insufficient to prove whether this rate would everywhere be sufficient. I hope the Executive Engineer will be able to complete his works considerably within the estimate.

14. The papers which accompany these estimates

e.g. vide Estimate for completion of Cooroor
Ancient & Headworks -
Value of work done at Rs.
General Estimate rates 12940
Expenditure 34170

*Agnt's No. 40.

Agnt's No. 593 dated
21 July 1868.

really throw very little light upon the great difference between the expenditure prior to 1865, and the value of the work done. Regarding a few of the works there is some explanation contained in Mr. Ross's letter, but these were the works particularly named by me as those which from personal recollection I thought had not been correctly measured and the result of the reexamination shows that the supposition was correct.

It is very clear that there was great mismanagement of the 7th Section prior to the cessation of work, and no doubt the investigations which have been required will have had a beneficial effect in attracting attention to the want of proper care exhibited.

As it would seem that no further explanations are likely to be forthcoming and as in the case of the 3rd Section Government considered it unnecessary to enforce a retrenchment, I would suggest that the past expenditure on the 7th Section be admitted to the accounts.

15. I also recommend that these revised estimates, with the exception of the two aqueducts referred to in para. 10 above, be sanctioned, and that the Chief Engineer be requested to submit designs and estimates for these with a clear canal waterway of 4.5 feet.

The amount to be sanctioned with these

has:

Amount of Estimate Rs: 229,000
Smaller Aqueduct Rs. 13,070
Larger ~~do~~ ^{320,40} ^{45,110}
Supplemental sanction now required 183,890

I have the honor to be,
Sir,
Your most obedient servant,
John Bullard Capt. R.E.
Comd. Eng. for S.W. Company.

P.S. There are mistakes in the Estimates as shown in pencil which would require an increase of 16,498 Rupees, but as Contingencies have been allowed for at the rate of 10 percent, and as the errors amount to less than 1 per cent on the value, Rupees 229,128, of the work remaining to be done, I have not thought it necessary to make any change in the Totals of the Estimates.

Yrs

Copied in Volume to England
of 6th July No 24 of 1869.

4:62 1/2 W. 1069 Dept
From Prof. J. H. P. J. H. P. J.
The Genl. Eng. J. H. P. J.

To
The Secretary to Government
M. C.

Dated 3 }
Recd 4 } March 1869

E. 1, 5

No 162-9-1 April 1869
Submitted for the Considera-
tion of Govt. a revised
Estimate of the Manning
works of the 7th section
Main Canal with certain
observations

No 235

C. 135 March 1869 C. 201

No 77

Macdonald & Co.

Chief Engineer's Office.

Perusal 24th April 1868

To.

J. H. Macdonald Esq.

Agent Macdonald

Macdonald

Sir.

With reference to Captain
Mulhiss's No 11 of 7th Inst. forwarded
with your endorsement No 22
of 17th Inst. I have the honor to send
you copy of Answer to Memo
of Quere's addressed to the
Executive Engineer of General
Division & printed in G. O. No
3611 of 22nd November as an
accompaniment to the Chief
Engineer's letter No 732 of 9th
October 1867

(Drawings of the works
requiring

No 346

M. J. & C. C.
 Naval Division
 Algiers 1st April 1888.

To
 The Chief Engineer

Sir,

I have the honor to Subjoin
 Answers to the Queries of the
 Consulting Engineer with reference
 to revised Masonry Estimates
 of this Division forwarded with
 yours 235 of 12th Oct. last. Cc'd
 to Mr. Peck.

1st Highest Known Flood at Jootoor

The only neighbouring village
 which abuts on the river is
 Jootoor close to the ancient.
 On the 27th November 1864 I made
 a careful investigation re-
 garding the highest Known
 flood.

First

First the Nurman & Red dy were
 questioned as to the height the
 river rose to, on the village
 sandy road, on the side near-
 est the ancient, and indicated
 a spot which I shall call
 A.

Second I a spot whose vegetable
 garden came down at an
 angle on this road, further
 up the river stated that in
 the highest flood he had
 known, there was barely
 room to pass between the
 water and his fence. This
 point I call B. Further up,
 on the track used by the
 women in drawing water the
 Nurman & Villagers showed
 me a point which I shall
 call C. And again further
 on

from, on the open bank of the river where it is steep and more irregular a point. (D) was shown, by a talkative old lady supposed to be the "oldest inhabitant" and who had lived in a hut, along side for a considerable number of years.

On the same day these points were carefully levelled by Mr. Frericks and were afterwards checked by Surveyor Partridge and their relative values found as follows.

Datum of Head Sluice at 193.58	
Below Kinross Datum	0.00
Present top of Head Sluice	14.00
Top of Head Sluice as shown in Revised Plan	18.50
Point A	14.67
" B	14.05
" C	13.35
" D	11.45

2nd

2nd Work done Foots. Amant. I am quite unable to say how the 101 C. gours has been arrived at nor was Mr. Parker able to give me any information on the subject. The field book of measurements of Mr. Amant contains a sheet signed by that gentleman and dated 3rd May 1867 showing quantity of work done at Foots. Amant. This sheet gives the same figures as Mr. Parker $\frac{125}{907}$ of 17th July 1867 to you. As this question was one of decided complexity I thought the safest way was to make my investigation completely independent and now beg to hand you detailed measurement of the work already done towards Foots. Amant.

with

with my Estimate of its Cost.

I have divided the work into two classes viz Common rubble & dressed stone and I think that this is all that is necessary; the quoins, cut waters & arch stones having received very little more dressing than the facing of the head and under, these walls, I have taken these walls as dressed back for a depth of 18".

3. Excavation Footings & Arch.

It is almost impossible to give a measurement

of the excavation done, but

I have checked the quantity

given by Mr. Smart as well

as I could, and conclude

that the 7000 Cuyards includes

the entrance channel & the

measurement

measurement of which is 532 Cuyards.

4. Head Piece Arch Wall. The whole of the arch work is finished and amounts to 1070 Cuyards as shown in my measurement attached.

5. Calipulab 2 The statement is incorrect. There are 473.83 Cuyards of masonry finished 750 Cuyards of excavation and 24-87 Cuyards silt to be removed and 16 Cuyards of sand on the ground.

6. Calver 11. There are 89-16 Cuyards of masonry done & 1562 Cuyards silt to be removed.

The measurement of the work done here has been got at at considerable expense

Shang & Co
17me Cuyards 1207 S. F. Hop
1207 J. F. Schwarz
and 5 Cuyards
S. F. Hop
S. F. Hop

N. 540.

Communicated with reference to the
Consulting Engineer's letter No. 1147th April
1868-

Mr. Martine Newton

Agent and Manager

Madras
30th April 68

Y

Id damid dalia
13th Feb 1869

To
The Agent

Revised 7th Section Masonry

1 In reference to G.O. No. 3611 of 22nd November 1869 I have the honor to submit a requested Revised Estimate amounting to Rs. 229,000 for the masonry works of the 7th section. The sum included for Agent Charges for Stores and Store Charges I have placed, as a separate item for sanction, though these charges are carried from month to month to the debit of particular works, because I have no data upon which to arrive at the probable apportioning of these charges.

2 The quantities of useful work found done is stated in the beginning of each Estimate except in Culvert 8 where no charge is made in the Estimate. No fresh information can be found to explain the disproportion between the quantity of work

To
G.O. No. 1229 of 23 March 1869
Copy in a letter to Engineer
of 6th July 1869

No. 40

From

The Agent of the Engineer
J. C. Lee

To

The Consulting Engineer
J. C. Lee

Copy of 13th Feb 1869

Received 13th Feb 1869

Enclosed copy of

the Engineer's letter

of 27th of Dec 24th of 1868

regarding the masonry

works with reference to

the Revised Estimate

of the 7th section

was found and that would naturally
be expected for the amount spent.
Certainly my experience of works will
not permit me to price them fairly
higher than the prices at Joplin and
Tuniford and the prices there paid
do not suffice to account for the
expenditure in the 7th Section when
applied to the quantity of work
found to be necessarily executed,
though those prices are likely to be
below the true cost, than the
prices at which work was generally
executed in the adjacent 6th & 8th Sections.
Consulting Engineer's letter to Secretary
to Government E. P. W. No. 97 of 180 pgs.
para 6. In the Estimates of the 3
Bridges Nos. 1, 2 & 3 of which the
first is in the 93rd mile, in my
copy the only mention of string
courses is in the following item "334
Running feet, string course at 0-3-0
Reports 62-10-0" perhaps the 3rd amount
has been entered in the wrong
column in the copy sent the
Consulting Engineer but the amount

would

think the amount
the entry is 571
high not the
value of the work

would show them to be as not higher.
3. Parag. Amount I have considered
that the highest flood level was
settled by Mr. Prof. No 3 of 1st April
sent to you, as agreeing with that
submitted by me. I have now carried
on the amount on the original site
with the modifications in the coping
recommended by Captain Mulhiss
in order to save delay and avoid
all confusion in afterwards settling
the site for the locks.

4. The working Drawings of the
Culverts have been made and are
now submitted. By increasing
the aggregate span & decreasing
the depth of each Culvert & some
alteration of sites, I have obtained
a system larger in area of waterway,
less buried in the ground & cheaper
than those previously sanctioned.

In accordance with Captain Mulhiss'
recommendation in para 16 Mr.
Prof. has hitherto constructed
the 8 ft. Culvert with abutments
2' 6" instead of 4' 0". This Captain
Mulhiss in his latest inspection
considered

showing the
plans. I have
submitted the
difference in
the value of the
work. The one was 4' 0" and the other 2' 6"

List of Revised Plans & Estimates of (7th Section)
Masonry Works.

Description of Plans	Estimates
General Plans of Head Works	Abstract Suppl. Estimate
Introductory	Comparative Statement
Regulating Locks	General Estimate No 1
Culvert No: 2	do. No 1A
do. " 4	do. No 2
Culvert " 5 & 7	do. No 3-4A-16-19A-20A
Culvert " 6	do. Estimate No 4
do. " 9	do. No 5-7-10A
Detached Emptying Sluice	do. No 6
Plan of Potlala Vagoo	do. No 8-24
Culvert 2 openings 20 feet	do. No 9
do. " 1 " 3 "	do. No 10
Agreement No 19 & 20	do. No 11-12
Plan showing position of	do. No 11A-24A
Agreement No 20	do. No 15-22
Culvert 3 openings 8 feet	do. No 17
Plan alteration of Culvert	do. No 19
Culvert No 24 Bridge 3	do. No 20
do. " 25	do. No 21
do. " 26	do. No 23
2 nd & 3 rd Class Bridges	do. No 25
5 feet Culvert 5 feet	do. No 26
Plans 3	

True copies

W. Hartwell Newcomb
Agent & Manager

No 24

Mada S Ingkang & Co.
Mada 18th February 1869.

From
The Agent and Manager
Mada S Ingkang & Co.

To
The Contracting Engineer,
In, & Coast Company.

I have the honor to forward herewith revised Plans and Estimates, as per accompanying List, for the Dredging Works of the 7th Section, with Copy of the Chief Engineer's letter, dated 13th February 1869, & request you will be good enough to obtain the early sanction of Government for the expenditure therein proposed.

The letter, from Mr. Rap, referred to in para 3 of the Chief Engineer's letter, was communicated to you with my No 40 of 30th April 1868.

The enclosure alluded to in paragraph 4 has been called for & shall be forwarded to you immediately on receipt.

I have the honor to be,
Very respectfully,
Yours,

W. Hartnell Newcomb
Agent and Manager

Pub. Works Dept.

No 1162

Proceedings of the Madras Govt.
In date the 9th April 1889.
Read the following:-

From the Jnsgr. for the
Madras Govt. to - (No. 1227) 3rd March 1889

With this letter
the Consulting Engineer
for the Madras Irrigation
and Canal Company sub-
mits masonry estimates
for the "Reckion" of the
Company's main Canal,
which have been revised
with reference to the order
of Government of the 22nd
November 1887, No 3611, in
which sanction for the
estimates, at that time
submitted, and amounting

N^o
W.M.
Apt

Received the 12th 3rd March 1889
Copy in letter to Engineer
of 11th July 1889

No 1227

1889

From the Jnsgr. for the
Madras Govt. to -
The Consulting Engineer, B. 1889

Received the 12th 3rd March 1889
Copy in letter to Engineer
of 11th July 1889

From the Jnsgr. for the
Madras Govt. to -
The Consulting Engineer, B. 1889

Received the 12th 3rd March 1889
Copy in letter to Engineer
of 11th July 1889

From the Jnsgr. for the
Madras Govt. to -
The Consulting Engineer, B. 1889

to Rs. 3,55,450 was withheld; and, while permission was granted for the construction of many of the works, the Consulting Engineer was directed to place himself in communication with the Chief Engineer, with a view to the alteration of the designs of some of the works, and to the preparation of more reliable estimates. The Govt. also declined to admit an overcharge of Rs. 33,910 without full and sufficient explanations.

2. The estimates now received amount to Rs. 3,59,179-10, and they are

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are somewhat in excess thereof of those prepared 2 years ago. Capt. Mullins shows, however, that the present estimates include many additional works, and that, if the works included in both estimates be compared, there is a difference of rather more than half a lac in favor of those of this year.

3. With regard to the overcharges, the Consulting Engineer reports that the papers accompanying the estimates throw but little light upon the great difference between the expenditure prior to 1865, and the value of the work done; but, as there

there is little likelihood
of any further explana-
tions being obtainable,
he recommends that
the excess expenditure
should be passed. From
recent reports the Govt.
have learnt that the
arrangements under which
the Canal works are now
being carried on are far
more satisfactory than
they were formerly, and
they accede therefore to
Capt. Mullins' recom-
mendation, and grant
permission for the re-
moval of the retrench-
ment of Rs. 33,910.

4. The Eng. Engineer
also

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also recommends the
sanction of the revised
estimates, with the ex-
ception of that part of
them amounting to
Rs. 45,110, which provide
for 2 aqueducts, intenda-
ed to carry the Canal
across the supplying
channels of the Pundia
Tank. These aqueducts
have been designed with
a Canal makerway of
only 30 feet in width,
although in Capt. Mullins' letter
transmitting the esti-
mates of 1867, and a copy of ^{which}
was communicated to
the Agent, it was pointed
out that the proper
width would be 45 feet.

The

The Chief Engineer has given no explanation as to his reasons for adopting a design against the sufficiency of which strong grounds had been advanced; and, as the Right Honble the Governor in Council concurs with the Chief Engineer in considering that the velocity of 3 miles an hour, which, it has been shown, would be necessary to pass the full supply of the Canal, would be extremely objectionable on a first class Canal of navigation, he must withhold sanction to the designs as submitted, and they should

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should be revised so as to provide a clear width of 45 feet. His Excellency regrets that, owing to the commencement of one of these aqueducts in anticipation of the approval of the design, there will be some delay and also loss of money occasioned by the change; but, so far as he can judge, neither the Govt. nor the Consulting Engineer are in any way responsible for these results.

5. Reducing the estimated cost of the aqueducts, the Parliamentary sanction

(9)

required is for Rupees
1,83,890, and this is
accordingly franked.

CD

Twenty one plans
+ twenty two Estimates

To the Managers. I. K. J. J.
Manager - do. do.

Recd. 10/1/19.

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~~Copy in Letter to England~~

~~Copy in Letter to England~~

Copy in Letter to England
of 6th July 1864.

100859

Govt. of 1869 Madras.

PUBLIC WORKS.

The Consulting Engineer
for Irrigation and
Canal Company

Dated

At

100859

100859

Nos 225-226

Final Report (March 1863)
Supplemental Estimate of Rs. 1,83,950
for masonry works of the
section of the Company's main
Canal, Santhome to the Sea.