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MADRAS RECORD OFFICE.

Government of Madras.

Public Works DEPARTMENT.

G.O. No. <u>3040</u>	Press Mis.
<u>414-415</u>	
Dated <u>22-10-</u>	<u>1864</u>

Not to be folded or roughly handled

115
*Proceedings of the Madras Government, Public Works Department,
22nd October 1864.*

No. 414. Read the following letter from L. BOWRING, Esq., Commissioner for the Government of the Territories of His Highness the Maharajah of Mysore, to the Secretary to Government, Public Works Department, Fort Saint George, dated Bangalore, 27th September 1861, No. 2,192-13:—

Sir,

1. Adverting to your letter, No. 2,413, dated the 22nd ultimo, enclosing a Minute by His Excellency the Governor, in connection with the proposed Mauri Cunwai Reservoir, I have the honor to forward herewith for the information of His Excellency in Council a copy of a communication, No. 1,126, dated the 31st idem, from the Officiating Chief Engineer in Mysore, submitting certain observations thereon.

No. 2, additional papers connected with the Mauri Cunwai, containing Colonel Cotton's letter, dated 14th June 1864, Major Sankey's reply, No. 981, dated 18th August 1864, also forwarded for the information of His Excellency in Council.

No. 415.

ORDER THEREON, 22nd October 1864, No. 3,040.

Copies of the papers received with this letter will be furnished to the Consulting Engineer, Madras Irrigation and Canal Company.

(True Extract)

(Signed) CHARLES A. ORR, Colonel, R. E.,
Secretary to Government.

To the Consulting Engineer, Irrigation and Canal Company, with two spare copies.

„ Manager for

do.

do.

Exd. T. O'Connor.

No. 2.

Additional papers connected with the Mauri Canvair
Project in Mysore.

Forwarded under letter No. 2123
dated 23rd July 1864 from the Depy.
Secretary to the Government of Fort
St. George P. W. D. to the Com-
missioner of Mysore.

Letter from Colonel H. C. Cotton, Chief Engineer, to
F. H. Henslowe Esq. Agent and Manager Madras Irriga-
tion and Canal Company, dated Madras, 14th June 1864.

SIR,

1. I have received by the favor of the Chief Commissioner in Mysore a copy of
a Report by Major Sankey, on my plan and estimate for a Dam at the Mauri Canvair.
This Report appears to be the same as that referred to in the Government order, dated
21st May 1864, No. 1,489, as to be forwarded to you by the Consulting Engineer, but
which did not accompany the Order.

2. In the proceedings of Government 8th August 1863, No. 2,231 it will be seen
that Mr. Bowring wished me to furnish a plan and estimate of the work I had proposed
and described in a former communication, with a view to its being referred to competent
professional judgment with Major Sankey's Plan, and in requesting to be informed of the
result of such reference I hoped to receive, not Major Sankey's own remarks, but those
of some unprejudiced judge. These remarks of Major Sankey's apparently profess to be
his judgment in the matter, but he deals with previous questions as a portion of this, and
makes assumptions to argue upon which are not in my plan but in fact opposed to it.

3. Had I found this to be a pure professional opinion on my plan, I should have
considered it to be what Mr. Bowring proposed, and should not have replied to it, but
there is in fact one part of the work only on which an opinion is given, viz., the sluice
valves, paragraphs 17 and 18, of which in a former part of the letter he truly says I
have furnished no plan.

4. I will remark on each paragraph of the report separately to show that the plan
and estimate I have furnished is dealt with unfairly not professionally, and not dis-
interestedly.

5. The 2nd paragraph states that in the Abstract to the estimate there are nine
items, of which only three are calculated on reliable data, and that this in itself would in-
validate any deductions drawn from it and prevent the possibility of any comparison with
Major Sankey's own project. Let it be observed that the three items named are the entire
Dam and Sluices estimated at Rupees 11,74,211 out of the total estimate of Rupees
12,66,520. This in itself would be sufficient for a comparison of the two dams, but there
are other items also closely reliable. The sluice valves although plans are not given have
been entered at an average price, which would not be disputed by a disinterested Engi-
neer. As all the sluices are under different pressures a separate plan would be required
for each to give minute details of their form and cost, a most unnecessary labour not
affecting the principles of the plan, unless it be true that they must necessarily rot before
they are accessible for repair. This is a professional opinion, and it is the only one
applying to my plan in the whole paper.

6. The next item is Rupees 5,000 for buildings. This is not questionable but fixed and limited. There is no reason why it should be exceeded, and it is perfectly unnecessary in the estimate to do more than determine the maximum sum to be allowed.

7. For excavating and baling no Engineer can give more than an approximate estimate. I have not now before me Major Sankey's estimate, but in all probability there is a similar item in it, for such is the universal practice.

8. For supervision and contingencies there is also invariably an approximate estimate intended to cover uncertain expenses, and the Engineer's own experience is taken as a fair warrant for it. There are only two items of Rupees 5,000 each which are not in fact such detail estimates as might be given, viz. levelling on the shoulder which forms an escape weir, and levelling and walling below the sluices, to form safe channels for the water clear of the dam.

9. Of these I will remark further as I proceed. But the fact that in an estimate of 12½ lacs of Rupees a sum of 10,000 is entered too vaguely, cannot reasonably be said to prevent a professional comparison of the two plans.

10. In the third paragraph Major Sankey says that I originally estimated the cost of the work at 6½ lacs. My original estimate was a comparative estimate showing that a high dam on my plan would cost less than a low dam on the plan proposed by Colonel Lawford. The only way of comparing their cost was by estimating on the same data, and it was on Colonel Lawford's data I made that estimate. Major Sankey's present rates are nearly double, and I have adopted them nearly, upon enquiring into prices on the spot. The remark that the many "omissions" in the estimate would raise the cost to near 20 lacs, is a statement altogether unsupported; nothing is omitted in my estimate and the rates are ample.

11. In the 4th and 5th paragraphs Major Sankey states that no provision is made for a waste weir, and that no allusion is made to such a work, but in the 9th paragraph of my letter. He might refer to the 4th and 11th also, and to the special character of the project which clearly provides for the escape over the *northern* not the *southern* saddle. It is provided that the saddles shall *not*, as Colonel Lawford proposed, be cut down, and the dam is raised expressly to the height which shall turn the course of the river without lowering them, and so retain the greatest possible supply of water. The fifth paragraph says I have taken no levels, but the ground of that statement does not appear. I have determined the height of the dam by that of the saddle as stated in the 9th paragraph of my letter, and in the 11th paragraph, I have explained that Rupees 5,000 is entered in the estimate not for lowering but for "any excavation and paving which may be required," in other words levelling the surface of the "broad flat plain" as this saddle is described by Major Sankey.

12. The 6th and 7th paragraphs quote a pamphlet by Sir A. Cotton to show the importance of a sufficient escape, but nothing is brought forward to indicate that it is insufficient. The 7th paragraph intimates that Sir A. Cotton proposed this very saddle as the waste weir for the tank. The principles of the work he had in view in writing that pamphlet were the same as those on which my plan is projected, viz., that the saddle provided by nature shall be made the outlet. Reliable levels had not then been taken, and Sir A. Cotton proposed to *raise* the saddle to give greater capacity to the Basin, but the levels given to him by Colonel Green, as not proved, were found incorrect, and the fall of the river appeared much greater than it really is. But this error only affected the capacity of the tank, not the principle of giving of the waste water at the northern saddle.

13. Major Sankey in his 8th paragraph and 9th gives an estimate for cutting down

another saddle to show what would be the expense of lowering *this* and condemns my estimate on that ground. I cannot admit that it shows any thing with regard to my project, the first principle of which expressly disallows all reduction of the capacity of the tank by lowering the natural hills.

14. The 10th, 11th, 12th, 13th, and 14th, paragraphs comment on the capacity of the tank quoting again Sir A. Cotton's pamphlet concluding that "the bund must be made at least 180 feet high on his own data" to contain 4,600 million cubic yards. It is not clear what data are here alluded to. Sir A. Cotton gives in his pamphlet a rough calculation of the capacity of the tank on the data given to him, this can have no bearing on the case under accurately taken levels, the argument is in fact founded on nothing, and further, the capacity of the tank has no bearing on the present question. I have made no reference to it because it is allowed that the high dam ought to be constructed if the cost is not greatly in excess of that of a low dam. The capacity makes no difference to the Mysore country, further than that it is in excess of its requirements. The capacity will be *greater* if the tank is filled to the height of the saddle than if the saddle were cut down as proposed by Colonel Lawford, or if Major Sankey's fall over the dam were adopted.

15. Paragraphs 15, 16 and 17, 18 and 19, 20 and 21 contain a calculation to show that my sluice shutters will be so long submerged, that they will rot. Major Sankey at the beginning complains that I have given no plan of these shutters, and how he comes to this conclusion without it, does not appear. We see teak ships afloat for 100 years not decayed, but if my plan is fairly considered, and it be allowed that floods occur to fill the tank only once in five years, it is clear that all the sluices will be accessible every fifth year for the renewal if necessary of the shutters, and for partial repair or strengthening; they are accessible always from the outside. But why are these valves to be spoken of as "perishable machinery" while the patent sluices adopted by Major Sankey are considered secure. Only because Major Sankey himself is drawing the comparison. The patentee himself does not advise their use under such great pressure as would be necessary in the dam I propose, and Major Sankey in order to using them in his project, has mis-calculated their effect, for he evidently cannot draw by them a sufficient supply for 50,000 Acres of land when the tank is less than half full.

16. I consider complicated machinery most objectionable in such works in India, and on this ground I have planned sluices to work under moderate pressure, and to be closed by simple shutters, which can be repaired or re-placed promptly and at a trifling expense.

17. In the 21st paragraph Major Sankey again quotes Sir A. Cotton's pamphlet which calls the attention of professional men to the importance of a full consideration of the subject of large discharges under great pressure, concluding that as Sir A. Cotton does not mention these patent valves, he had never heard of them. Let Major Sankey refer that matter to the patentee or any other competent authority, and he will find that they are not suitable to such pressure and such discharges as Sir A. Cotton referred to. At all events I do not adopt or recommend them, and with this professional opinion Major Sankey is most welcome to contrast his own. It is the object of this correspondence to obtain if possible disinterested professional opinions on the two plans.

18. In the 22nd paragraph Major Sankey meets the objection I raised to the form of his Dam. I stated that in my judgment the over-fall as planned is a vital objection to the work. In my opinion the arches built to receive the over-fall could not stand, and their failure I consider fatal to the whole work. Major Sankey says "in case the rock at foot is sufficiently unyielding this feature may be omitted altogether." It is

only essential in case of the rock being of a different texture" so that all depends upon the nature of the rock, and that nature is not ascertained. But I go further and state as my opinion that if the rocks withstood the power of the over-fall, the pressure against the dam in its reduced section, would destroy it.

19. The 23rd and 24th paragraphs again refer to the supply, which I have not considered it necessary to touch upon. I certainly cannot allow that I consider Major Sankey's calculations correct where cubic feet are converted into quasi cubic yards by dividing by nine, and necessary as it may be to our Company to know what the supply is likely to be, it is no part in the question before the Mysore Government, it having already been decided that the greater reservoir, and therefore a high dam and the escape of surplus water over the northern saddle is preferable, if only the plan and estimate are approved.

20. With reference to the 28th and last paragraphs I must be allowed to say that so far from Major Sankey's criticism being from any point of view the same as mine, I see no single point in which our views agree. I trust as originally intended, the two plans will be referred to some Engineer authority unconnected with their projectors.

MYSORE PUBLIC WORKS DEPARTMENT,
CENTRAL OFFICE,
CURRENT BRANCH.

No. 981.

From

MAJOR R. H. SANKEY, R. E.

Officiating Chief Engineer in Mysore.

To

THE SECRETARY TO THE COMMISSIONER
FOR THE GOVERNMENT OF THE TERRITORIES
OF HIS HIGHNESS THE RAJAH OF MYSORE.

Dated the 18th August 1864.

SIR,

In acknowledging the receipt of the communications as per margin, forwarded under your docket, No. ¹¹⁹₂₉₀ of the 29th ultimo, I have the honor to transmit herewith, three copies of my former report on Colonel Cotton's Plan for the Mauri Cunawai Dam, as requested in para 2, and beg to offer some brief observations on the reply submitted with the Consulting Engineer's letter No. 32 of the 5th July 1864.

2. Colonel Cotton complains in the early portion of his communication, first of the fact, that I should have been allowed to criticize his Plan and Estimate, and secondly that my remarks show that I have dealt with him "unfairly" and "not disinterestedly." I need only observe that the expression of my opinion was simply a duty I owed to Government, and the complaint itself is, to say the least, singular, considering the numerous criticisms of my own project emanating from Colonel Cotton which I had to meet, before he could be induced to give any Plan or Estimate of his own. As regards myself I court the most adverse and even hostile criticism, being well aware that in a work of this magnitude the grounds require to be thoroughly sifted, both to save the State from undue expenditure, and insure by every means the perfect safety of population residing below the Dam, from any accident.

3. Regarding the explanations given in paras 5 to 9 inclusive of Colonel Cotton's present letter, it is needless for me to remark that they simply confirm my remarks as to the entire untrustworthiness of his Estimate, it being quite clear that where the details of several important items are omitted, the assumed cost must be mere guess work.

4. In para 10 Colonel Cotton after endeavouring to show how his first project only amounted to 6½ Lakhs (an amount which I must say appears to have been taken by sheer assumption, no plan having ever been submitted in support) now observes that he has adopted my rates "nearly;" that the many omissions I remarked on, are "altogether unsupported;" that *nothing* is omitted in his Estimate; and that the rates are ample. These observations require distinct refutation.

5. There must always exist differences of opinion where the *same* rates are not employed, I may therefore be fairly allowed to ask why if a true comparison of the two schemes was desired, my rates were not adopted even though under protest? The investigation of one item alone in Colonel Cotton's Estimate, will at once show how very fallacious is the principle of adopting "nearly," and not "exactly" the same rates in the calculation.

6. The item is the chief one in Colonel Cotton's Estimate, viz. 1,89,137 cubic yards of Rubble stone in chunam at 5 Rupees—Estimated cost Rs. 9,45,685.

7. In my Estimate this species of work is estimated to cost 2a. 9p. per cubic foot, or Rs. 4: 10: 3 per cubic yard, but there are three other elements in my calculation, directly connected with this, of which Colonel Cotton takes no notice whatever; the *first* is that I provide the stone by quarrying the southern saddle, an item of upwards of two Lakhs in my estimate; the *second* is that the total height of my Dam is but 105 feet (on-ly 90 feet to top of central waste weir) while Colonel Cotton's has a total of 162 feet (150+12ft.) as indicated by the plan; and the *third* is that I provide Rs. 10,000 in my Estimate for "Scaffolding."

8. Now the item for "Removal of earth and rock" taken by me at 12 annas per cubic yard, of course provides for a great quantity of mixed material of which possibly one half might turn to use for building purposes, that is to say the stone actually built into the work would certainly cost not less than 1½ Rs. per cubic yard as delivered at site—I will however assume that Colonel Cotton could do the work cheaper, and bring the stone to site for 1¼ Rs. per cubic yard.

9. In the next place it is perfectly clear that with a sheer lift for his material, of 57 feet in excess of mine, his rate should at the least be enhanced by 10 per cent—and lastly his charge for Scaffolding should be at the lowest Rs. 15,000.

10. In order therefore to institute an exact comparison between the two schemes, Colonel Cotton's rate should stand thus

	Per cubic yard.
To part material and general workmanship.....	4 10 3
To Stone delivered at Site.....	1 4 0
	5 14 3
Add 10 per cent, for extra lift.....	0 9 5
Total, ~~excluding~~ cost of Scaffolding.....	6 7 8

say the charge of scaffolding could be met by a rate of 2 pie in each cubic yard, and we have the true rate for Rubble stone in chunam, put into Colonel Cotton's work, as Rs. 6½, and not 5 Rs. per cubic yard. Calculated at this rate the cost of this item would be Rs. 12,29,390, or Rs. 2,83,705 in excess of the amount given by him.

11. Colonel Cotton calls in question my observation as to the excess Rupees 1,86,200 which must occur in regard to the construction of the waste weir, but as I shall immediately dispel all doubts on this point, I may here assume the excess as proved.

12. Colonel Ludlow in para 14 of his letter No. 90 of the 3rd November 1863 in criticising Colonel Cotton's plan considering it "to be indispensably necessary in a work of this magnitude and importance, to allow for imperfection of workmanship, and to guard against the possibility of failure" recommends "first that all the masonry between the floor of the sluices and the rock be set in lime; second, that the interior slopes of the outer walls be altered so as to bring the centre of gravity of each wall more within its base; third, that two horizontal or strong courses of cemented masonry each three or four feet thick be built between the base and apron of the uncemented core; fourth, that cross walls of cemented masonry be built between the front and rear walls at distances of about 50 feet apart; and lastly, that the works be properly tabled and stepped, so that the base of the Dam may rest firmly upon it." There can be no question of the soundness of this opinion, but there can also be no question that these alterations and additions would cause an excess of not less than $1\frac{1}{2}$ Lakhs.

13. Putting therefore these three items of excess together we find:—

To extra outlay on Rubble Masonry, para 10	2,83,705
To do on waste weir para 11	1,86,200
To do by alterations considered essential by Colonel Ludlow para 12	1,50,000

Total excess on three items. 6,19,905

14. If to this be added the amount of Colonel Cotton's Estimate Rs. 12,66,520 the probable outlay is raised to 18,86,425 or say 1 Lakh below the total I stated the project would cost. There can be no doubt that the extra sum required for the sluices, and other items insufficiently estimated for, would easily make up this difference, I therefore see no reason to alter the opinion originally formed.

15. I now pass on to consider the question of the position of the waste weir in Colonel Cotton's project which he says distinctly in the present communication, is to be placed in the *northern* (known as the *Mardihully*) and not the *Southern* saddle. I stated Colonel Cotton had not taken levels to this point, and am glad to find from the tenor of his para 11 that he does not deny this.

16. The fact is the lowest point of the saddle is 146.5 feet above datum, not 140, and as from my inspection I take it to be 7 or 800 yards wide, the matter is of considerable importance. Say for instance it is 700 yards broad, that the Callingula as estimated by Sir A. Cotton be taken at 400 yards long and that there be $1\frac{1}{2}$ yards in depth of rock and earth removed over all. The quantity to be removed would thus be 4,20,000 cubic yards which at even so little as 8 Annas per cubic yard would amount to Rs. 2,10,000. As by the same authority provision should be made for the waste weir running 3 yards deep a bund must be constructed across the rest of the Gorge; wings provided, also steps in rear, and a lead off channel to the river (at least $1\frac{1}{2}$ miles in length) all which could not possibly be done for less than $1\frac{1}{2}$ Lakhs of Rupees; the cost of this work would then not be less than $3\frac{1}{2}$ Lakhs.

17. It would therefore be clearly the best policy to place the waste weir in the *southern* and not the *northern* saddle, as by employing the latter, the total of the Estimate must be raised to $21\frac{1}{2}$ instead of 20 Lakhs.

18. Up to this point I have criticised Colonel Cotton's project, as in my former paper entirely from his own point of view, that is adopting as true his Estimates of the

available supply of water, I have endeavoured to shew that to execute the high bund must cost the sum I have named, now however in para 12 of the communication under reply, I find an avowal of error which I must say, should long ago have been made. It is to the effect that the levels upon which rested all Sir Arthur Cotton's, Colonel Cotton's, and Colonel Rundall's calculations of the flood discharge of the Huggry at the gorge were *wrong*! This admission of itself entirely invalidates all the arguments for a high bund.

19. Sir A. Cotton in the commencement of his pamphlet of 12th April 1858, states that the site of the proposed tank "is in comparison of most sites very unfavorable, having a fall of 13 feet a mile so that a bund of 200 feet would only make a tank 15 miles long." Now several years ago it was proved by an Officer of the Irrigation Company, and the fact was subsequently confirmed by levels taken by this Department, that the fall of the country and river bed towards the Gorge was only $4\frac{1}{2}$ feet per mile, it is therefore clear that the tank when full to the sill of the waste weir as now proposed by Colonel Cotton (140 feet above datum) incredible as it may appear, would stand back upwards of 30 miles or to within 5 miles of Cuddoor, and would need a river of the full capacity of the Kishnah to fill it! Such is seriously the result of the proposal put forward by the Irrigation Company.

20. It is needless to say that the calculations of the flood discharge of the Huggry, put forth in the pamphlet above quoted, and repeatedly brought forward since, resting as they do upon this false datum, and never to my knowledge corrected in any public document, are wholly imaginary, so far therefore as regards the correctness of Colonel Cotton's present Estimate, or his arguments in favor of a high bund, I might at once close this communication; I owe it however to myself to clear up one or two points, prominently adverted to by him, in the latter portion of his communication.

21. In para 15 he observes with reference to the self-acting sluices proposed to be employed by me "the patentee himself does not advise their use under such great pressure as would be necessary in his project." This may possibly be the case, but so far as my own plan is concerned, I beg to state that before introducing them I wrote to the inventors Messrs. Lawrence Brothers, stating all the circumstances of the case, and was informed by them in reply that there was no necessity to employ their large sized sluices (those in my plan) as smaller ones worked by screws would suffice—in other words the large sluices were considered by them *more powerful than was requisite*.

22. In the next place Colonel Cotton considers, I have not sufficiently met his objection, to the drop well in rear of the bund. On the other hand I am myself perfectly satisfied, that with the employment throughout of cut stone (as provided in the Estimate) joggled together and fixed with iron cramps, there would not be the most distant chance of disruption, even with ten feet of water flowing over the weir above. The whole of this part of the work was devised to meet such an extreme case, as it is difficult to conceive could ever occur.—In fact I am prepared to show, that with all the floods we are acquainted with, not a single drop of water could ever have passed over the proposed central waste weir, that in the southern saddle, being more than sufficient to carry off, one of double the magnitude of the highest known.

23. I have every reason to believe, from my examination of the rock in the immediate neighbourhood, that this feature as before stated may be entirely omitted, some thickening to the rear portion of the bund being alone in that case requisite. All it is here necessary to state, is the fact that whatever charge may be introduced into this portion of the work, from the circumstance mentioned, my present estimate will prove more than ample to meet it, as the alteration whatever it be must economise the quantity of material.

24. Lastly in para 19 Colonel Cotton rejects my calculations, from the fact that in the first confessedly rough project, put forward in January 1862, a provckingly absurd clerical error had crept into the last column of the discharge table attached to it. No such objection could be urged to the correctness of the calculations, put forward with the project submitted for the consideration of the Government of India, in March last year, and I think I may consider myself permitted to state that they have undergone the scrutiny of Colonel Smith, the consulting Engineer for the Irrigation company in England.

25. The error however such as it was (reducing the whole discharge of the river for the year to but 107 million cubic yards of water) shews in a very singular manner the correctness of the opinion I have all along maintained, as to the extremely small supply of water, derivable from the catchment basin above the gorge, as compared with the almost fabulous amounts predicted by the Irrigation company's advisers. I do not therefore regret its occurrence, and feel obliged to Colonel Cotton for having pointed it out. I must however again repeat that notwithstanding all the time which has passed, since Sir A. Cotton first reported on the work, Colonel Cotton has not put forward a single reliable fact tending to clear up the difficulties connected with this important work.

I have the honor to be,

Sir,

Your most Obedient Servant,

(Signed) R. H. SANKEY MAJOR R. E.

Officiating Chief Engineer in Mysore.

BANGALORE,
18th August 1864.

PUBLIC WORKS DEPARTMENT.

PUBLIC
FORT SAINT GEORGE,

22nd August 1864.

No. 2,413.

No. 457.

From

MAJOR J. H. M. SHAW STEWART, R. E.,
Deputy Secretary to the Government of Fort Saint George P.W.D.,

To

The Commissioner for the Government of the Territories of
His Highness the Rajah of Mysore.

SIR,

In continuation of my letter of the 23rd July 1864. No. 2,123, I am directed to forward herewith a Minute by His Excellency the Governor, on the relative advantages of the schemes which have been prepared by Colonel Cotton, and Major Sankey, respectively, for a Dam at the Mauri Cunwai.

I have the honor to be,

Sir,

Your most obedient Servant,

J. H. M. SHAW STEWART, MAJOR, R. E.,
Deputy Secretary to Government.

Exd. S. T. Augustin.

Proceedings of the Madras Government, Public Works Department, 22nd August 1864.
Read the following.

No. 455.

MINUTE BY THE HONORABLE THE PRESIDENT.

It seems to me that this is a controversy with which this Government has nothing to do; as however it has come before me I may say that Colonel Cotton's plan appears to me to be in every respect a cheaper and a better one than that submitted by Major Sankey. I do not however see any reason why Colonel Cotton should build a dam 180 feet high when 80 feet or thereabouts is all that can be required to retain the maximum amount of water; the mere fact that it will be as cheap to build Colonel Cotton's high dam, as it would to finish Major Sankey's low one, is hardly enough to justify the construction of an unnecessary mass of building, sluices, &c. If Colonel Cotton's large dam would cost any given sum, say 12 lacs, a dam half the height, on the same plan, would contain one-fourth of the material,

and should not, therefore, cost much more than 3 lacs. Some allowance would have to be made for extra work in waste weirs, &c. but this ratio would hold good generally, and this should be brought clearly under the notice of the Commissioner of Mysore.

August 1864.

(Signed) W. T. DENISON,

No. 456.

ORDER THEREON, 22nd August 1864, No. 2,412.

Ordered that the following letter be despatched:—
(Here enter No. 2,413, dated 22nd August 1864.)

(True Extract.)

(Signed) J. H. M. SHAW STEWART, MAJOR, R. E.,
Deputy Secretary to Government.

Exd. S. T. Augustin

MYSORE PUBLIC WORKS DEPARTMENT.
CENTRAL OFFICE,
CURRENT BRANCH.
31st August 1864.

No. 1126.

From MAJOR R. H. SANKEY, R. E.
Offg. Chief Engineer in Mysore.

To
*The Secretary to the Commissioner for the Government of the Territories
of His Highness the Rajah of Mysore.*

SIR,

In acknowledging the receipt of the Minute of His Excellency the Governor of Fort St. George as per margin forwarded under your docket No. 1126 of the 29 instant, I would venture to offer a few brief observations regarding the two points adverted to, as the high position and professional reputation of Sir William Denison will doubtless carry with it the greatest weight, and influence the decision which may be arrived at by the Government of India.

2. While approving of Colonel Cotton's general design for the work, His Excellency sees no reason why he should build a high Dam when one of "80 feet or thereabouts is all that can be required to retain the maximum amount of water." As I have shewn that with this height of Bund the Tank would only store sufficient water for the irrigation of 50,000 acres, it will I trust now be sufficiently evident that the arguments hitherto advanced by me are perfectly valid—and if this be the case it necessarily follows that the small supply of the whole catchment basin above the gorge, could be of no possible use to the Irrigation Company. The work must therefore be carried out by Mysore for Mysore uses only.

3. This point finally settled, it would only remain to satisfy Government that the style of work proposed by me is both the best and cheapest. Here however I must admit that a serious difficulty has arisen from the very express declaration of Sir William Denison, that Colonel Cotton's design applied to the height of the small bund would cost only 3 Lakhs with certain additions for waste weirs, &c. it is thus incumbent on me to shew to the best of my judgment, as nearly as possible what the real cost of this application of Colonel Cotton's design would really come to.

4. This however I can only do in a very rough way, as without detailed plans and Estimates shewing the whole scope of the revisions proposed, it would be quite impossible to do so with any exactitude. In making the comparison which I now venture to place before the Commissioner, I would beg it to be understood that a certain latitude must necessarily be allowed in the various assumptions I shall have to make.

5. In the first place Colonel Cotton's design for the arrangement of the sluices and rear channels, does not admit of the application of a central waste weir as in my design. This essential work must therefore be provided either by cutting down the adjoining sides of the hills to 150 feet on either side, or the whole length (300 feet of sill) must be added to the escape in the Southern saddle, making a total length of waste weir at this point 400 feet.

6. As the latter would prove by far the cheaper arrangement I shall assume that this course would be followed. For cutting a waste weir 100 feet long in this position it will be seen from the abstract of Estimate submitted with my Report of March 1863 the cost is Rupees 2,43,210, it follows therefore that to cut one out 400 feet in length would cost Rupees 9,72,840, at the very least, as the saddle rises and increases in width from the lowest point (see the section appended to my project.)

7. The next point to be considered is the relative height of the mass of the two proposed Dams. Colonel Cotton's, as given in his plan, is 162 feet, there is a small lift wall above but the mass is only this height, my dam is 105 feet high excepting for 300 feet in the centre which is only 90, say therefore generally as compared with Colonel Cotton's, mine is two thirds the height of his. His design therefore cut down to the height of mine would contain very nearly one half the material of his original one, indeed it would be quite this amount, as his dam admitting of no central waste weir, must be carried at the full height of 105 feet the whole way across.

8. I have shewn in my two previous papers on this subject that Colonel Cotton's dam carried out exactly at my rates would cost 20 Lakhs. Take from this 1,80,000 or say 2 Lakhs for the cost of his waste weir (see the papers referred to) and we have 18 Lakhs as expense of the dam alone. To build one the height of mine on his plan as above explained, would be half this or 9 Lakhs. We have therefore the whole probable outlay to be

	Rupees.
To 400 feet of waste weir in Southern Saddle. ..	9,72,840
To Dam alone. ..	9,00,000
Total probable cost ..	Rs.. 18,72,840

or more than 6 Lakhs in excess of mine.

9. I would beg now to state that at least 18 months before Colonel Cotton produced his plan, Colonel Lawford and I discussed fully a great number of methods of carrying out the work on the most economical principles, and among others, the plan of perforating the dam, and employing a number of sluices, under small heads, as now proposed by Colonel Cotton, but it was given up partly on the ground of expense, and partly because this plan, from the possible failure of a single one of the numerous channels, exposed the work to such very great risk. I must now be permitted to state that so far as I can judge it would not be safe to apply Colonel Cotton's principle to the projected bund, and that unless so modified as to admit of a central escape it must cost far more than mine.

I have the honor to be

Sir,

Your most obedient Servant.

BANGALORE,
31st August, 1864.

R. H. SANKEY, MAJOR, R. E.
Offg. Chief Engineer in Mysore.

1864.

Enclosed in a letter from the Commissioner
of Mysore, to the Secretary to Government in the
Public Works Department, Fort Saint George
dated 27th September General 7, 2192
of 13

pin 4 225/64

Copy of correspondence regarding
the proposed Mancini Kunwari
project.

24/9/2004

General No 2192
Agricultural 13

Mysore Commissioner's Office. 11/5
1864/65

From, The Commissioner for the Govt of the
Territories of His Highness the
Maha Rajah of Mysore.

To, The Secretary to Government.
Public Works Department.
Fort Saint George.

Dated Bangalore 27th September 1864.

Sir,

Adverting to your letter No
2413 dated the 22nd ultimo, enclosing a
Minute by His Excellency the Governor in
connection with the proposed Mauri Tan-
-nir Reservoir, I have the honor to for-
-ward herewith for the information of His
Excellency in Council a copy of a communi-
-cation No 1126 dated the 31st ultimo from
the Offg Chief Engineer in Mysore sub-
-mitting certain observations thereon.

2.
No 2 additional papers connected
with the Mauri Reservoir containing:
Col. Cotton's letter of 14th June 1864.
Major Sankar's report of 9th August 1864.

The papers noted in the mar-
-gin are also forwarded for
the information of His Ex-
-cellency in Council.

I have the honor to
Sir,
Your most Obedient
Serving
Commissioner.

two items submitted, I adhere
 to the opinion I have before
 expressed - I do not pretend
 to correct the estimates. I
 adhere to the principles upon
 which the items are based, and
 especially to that part of the
 Cotton item which substantiates
 several clauses with a small
 preparation of work when working
 in the present cotton clinics of
 Magnolia.

Enclosed for the order
 of the
 Secy. of the
 C. & G. P.
 Secy. of the
 C. & G. P.

Nothing can be easier than to make such little
 errors as these contained in Magnolia. They may be correct in their own
 right, but as I said before with the correctness in the
 correctness of the work of the cotton clinics. I am for
 the Cotton Clinics to satisfy himself as to the
 accuracy of the discharge of the items. The quantity
 quoted he may be able to find up. The quantity
 he may require for Magnolia Clinics in Magnolia
 the balance may then be available for the Clinics
 Magnolia Clinics take up without the Clinics
 as the Clinics may agree to, as present we are for
 carrying quantities for which we have no available
 data - as regards the comparative results of the

Pro 22 August 1864 at 4530
157

No 414. 415

with this letter will be furnished to the En-
gineer's Practice Inspector General Company

Copies of the papers received

242 3040

To the Chief Engineer & Boarding with 2 spare copies.
" Manager & Engineer & Chief Staff 24 October
22nd Oct 1864

17/1864 Paper
Pro. of Govt for October
1864. 4226.

From The Commissioners of Mysore.

To The Secretary to Government
S. M. S.

Dated } 27th September
Despatched }
Received 29

Enclosures, No. 1

General No 2145

No 13
67

Adverting to his order dated
22nd October, forwarded for the super-
intending the execution in to me
of a communication from the
Chief Engineer submitting
certain observations, regarding
the proposed Mammal Pannu
reservoir.

With an Order.

242 3040 - 22nd Oct 1864

21 Oct 1864 21 132