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MADRAS RECORD OFFICE.

Government of Madras.

Public works **DEPARTMENT.**

G.O. No. 1007
640-641

Press
~~Mis.~~

Dated 27—3— 1866.

Not to be folded or roughly handled

Proceedings of the Madras Government, Public Works Department,
27th March 1866.

No. 610. Read the following Proceedings of the Government of India in the Public Works Department, (Civil Works—Agricultural,) dated Fort William, 24th February 1866, No. 205 C:—

Sir Arthur Cotton's strictures on the scheme for remodelling the Ganges Canal.

Read again:—

The Resolution in this Department, No. 227 C, dated 27th February 1865, on Major Crofton's Scheme for remodelling the Ganges Canal.

A Despatch from Her Majesty's Government, No. 34, dated 30th June 1865, approving of the carrying out of Major Crofton's project.

Read:—

Two letters from Major-General Sir Arthur Cotton, Kt., dated 9th and 16th November 1865, on the subject of Major Crofton's project.

1. Observations.—The project prepared by Major Crofton, R.E., for remodelling the Ganges Canal, was approved by the Governor General in Council in the Resolution of the 27th February 1865, and has since been sanctioned by the Secretary of State.

2. In according the approval of the Government of India to this project, the objections of Major-General Sir Arthur Cotton were considered, and it was determined by the Governor General in Council that there appeared to be no sufficient *primâ facie* reason for abandoning the upper section of 100 miles of the Ganges Canal, in order to adopt a head for the Canal lower down the Ganges, as proposed by Sir Arthur Cotton. It seemed to the Governor General in Council that the case was so far clear, that it was not worth while further to pursue the project for the dam across the Ganges below the junction of the Solani, with new head-works and line of Canal to join the existing line. No further action was therefore taken on this proposal, but reasons were given why the Government of India considered that Sir Arthur Cotton may have misapprehended the state of the case.

3. The decision come to was submitted to Her Majesty's Government in England, and was approved. It was presumed that had it been considered necessary, notice of the course of action taken would have been communicated to Sir Arthur Cotton from the India Office.

4. Sir Arthur Cotton has since addressed the Secretary to the Government of India in this Department, complaining of the manner in which his proposals have been treated, and still urging the Government of India to consider the subject further, before adopting finally Major Crofton's project; and he gives his reasons for not placing confidence in that Officer's results.

5. While the Government of India regret that so much personal feeling should have been imported into this question, and although there still appears to the Governor General in Council to be reason to suppose that Sir Arthur Cotton may have misapprehended the state of the case owing to his not being aware of local circumstances, still it is fully admitted that the opinion of so distinguished an Engineer is deserving of the most attentive consideration. Whether in view to the right guidance of the Government, or to the satisfaction of the public as to the course it may determine to pursue, it seems right that the matter should be further investigated.

6. The Governor General in Council therefore resolves to convene a Committee of impartial Engineers to report upon the propriety of proceeding, as previously determined, with Major Crofton's project, which is now in progress of being carried out. On the report of this Committee, the Government of India will be able to decide whether to go on with Major Crofton's project, or to stop its progress pending the preparation of a detailed project after Sir Arthur Cotton's views, with a comparison of the cost and advantages of that project with those of Major Crofton's project.

7. In order to ensure, as far as possible, impartiality in the Committee, the Government of India has determined to exclude on the one hand Officers whose training in the engineering of irrigation works has been acquired only in Northern India, and on the other hand also those who are known to hold strongly opinions concurrent with those of Sir Arthur Cotton. But still it is desirable to include amongst the members Officers fully acquainted with the irrigation system of Southern India.

8. The Governor General in Council, therefore, selects the following Officers:—

Colonel E. Lawford, R. E., of the Madras Establishment, Chief Engineer of Mysore, an Officer of 35 years' service in the Madras Presidency and in Mysore, and of long experience in irrigation works.

Lieutenant-Colonel J. C. Anderson, R. E., of the Madras Establishment, Consulting Engineer to the Government of Madras, in the Railway Department, and who has served both in the Punjab and in the Madras Presidency, and is acquainted with the irrigation system both in Northern and Southern India.

Lieutenant-Colonel Fife, R. E., of the Bombay Establishment, an Officer well-known for his experience in irrigation works in Sindh and Western India.

Mr. Sibley, Chief Engineer of the East Indian Railway in the North-Western Provinces, whose services have been placed at the disposal of the Government of India for this purpose by the Agent of the East Indian Railway.

Mr. H. Leonard, C.E., Superintending Engineer, South-Eastern Circle, Bengal.

9. The Committee will meet at Roorkee. Colonel Lawford will be appointed President, and the Committee will make its report to the Government of the North-Western Provinces, in order that it may be submitted to the Government of India with the opinion of His Honor the Lieutenant Governor.

10. Major Crofton will attend the Committee to explain his project, and the Committee will also be able, if it be considered necessary, to take the evidence of Lieutenant-Colonel Dyas, the Chief Engineer of Irrigation Works in the North-Western Provinces, and of Colonel Rundall, R. E., who reported jointly with Sir Arthur Cotton on the Ganges Canal, and of any other Officers whose opinions it may be desirable to take.

11. It is probable that the Committee will not be able to meet before the middle of March, but of this due notice will be given. In the meantime, the several Officers have been warned.

12. Instructions have also been issued to the Government of the North-Western Provinces to prepare at Roorkee, for the information of the Committee,

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the records of surveys and levels, and to cause such additional lines of levels to be taken as may appear desirable to lay before the Committee. Aided by these, the Committee will, it is expected, be able, within a few weeks, to examine the country and pronounce upon Sir Arthur Cotton's proposal, so far as to decide the question as to the propriety of causing a detailed project to be prepared or not.

13. In connection with this subject, it is observed by the Governor General in Council that, although Sir Arthur Cotton's objections are based mainly on engineering questions, the degree of success attainable in the construction of Canals and other irrigation works, is due in a great measure to matters unconnected with engineering, and depending on climate, soil, the system of agriculture and the habits of the people. These differ materially in Northern and Southern India, and the differences in opinion which appear between the Engineers of the two regions, arise, doubtless, in some measure, from want of full knowledge on these points, as well as from want of familiarity with the local physical geography.

14. It would doubtless conduce much to clearing up differences and doubts upon the subject of irrigation works if Officers familiar with the system in Northern India were deputed by the Government of the North-Western Provinces and the Punjab to report on the works in the Madras Presidency; and, similarly, if Officers from the South were deputed by the Government of Madras to inspect and report upon the works of Northern India.

15. The Government of India invites the attention of the Governor of Madras in Council, and of the Lieutenant Governors of the North-Western Provinces and the Punjab, to this subject, and will be ready to receive proposals for deputing Officers for the object indicated.

ORDER.—Ordered, that a copy of the foregoing Observations be forwarded to the Government of the North-Western Provinces for information and guidance.

Also to the Governments of Madras and the Punjab.

Ordered also, that copies be forwarded to the Governments of Bombay and Bengal, and the Chief Commissioner of the Central Provinces, for information.

Ordered further, that a copy be forwarded, to Major-General Sir Arthur Cotton, as a reply to that Officer's letters entered above.

(Signed) C. H. DICKENS, Lieut.-Colonel, R. A.,
Secretary to the Government of India.

From Major General SIR A. COTTON, Colonel Commandant, Madras Engineers, to Secretary to Government of India, Public Works Department, dated 9th November 1865.

[1.] I have received the Blue Book containing the proceedings on the Ganges Canal, lately printed, and as they contain frequent reference to my opinion on the subject, though the papers have not been officially forwarded to me, I have the honor to request that I may be allowed here to reply to the remarks made on my non-official papers.

[2.] I trust that Government will acknowledge that, as far as concerns my personal interests, I may fairly claim to be heard in answer to remarks so severely censuring my professional opinions; and not only so, but that as an Officer of long experience (and surely, I might be permitted to add, whose works have, under God's blessing, as seems now to be most fully acknowledged by the proper authorities—returned, and are now returning such large sums to Government as to amount really to quite a considerable item in the revenue) I might justly ask for the public service, that what I have to say at this great crisis may be heard, as well as the Officer who has censured my opinions.

[3.] I must beg, first, earnestly to call attention to the importance of the crisis at which we have arrived. The work which has been dealt with as the great and decisive work of Government in this line, to which the attention of the public has repeatedly been called in numerous public documents, and especially in the Earl of Dalhousie's Minute, at the close of his administration, has now arrived at a point at which a most voluminous Blue Book is called for, and upon a review of the whole case a sum of more than half a million is required,* not for any extension or partial improvement, but, as it is justly called, for the re-modelling of the whole project, requiring that the works should be closed, and their whole operation stopped for one or two seasons, in consequence not only of the entire failure of the project after 20 years to make any fair returns in money, but much more in consequence of the absolute insecurity of the works—making a complete reformation absolutely essential.

[4.] Now, it is most obvious that, matters having arrived at this point with respect to such a work, the whole question of irrigation and navigation for India is brought to a complete issue.

[5.] The question of dealing with this individual work, and how it may most effectually be rendered secure and remunerative, great as it is, considering that three millions have been sunk on it, at least half a million more is required, is really quite insignificant compared with the question that arises out of it, which is nothing less than this.

[6.] Is this a fair type of Irrigation Works, or is it not?

[7.] Must we conclude from it, that nothing more can be hoped, than that other projects cannot be expected to produce more satisfactory results than this?

[8.] If so, then, what hope is there of the extension of this system throughout India?

[9.] Would the Government be justified in prosecuting a system of works, which will involve the laying of new taxes on India, in order to pay the interest of the money so invested, for, of course, the interest must be paid, and for this there is no alternative but new taxes?

[10.] If, on the other hand, the failure of the work to pay its own expenses after so long a time is really owing to causes quite alien to the general scheme of the regulation of the waters of India, it is of the utmost importance, that the public, as well as the Government, should be fully satisfied on this point in order that this great hindrance to the prosecution of the enterprize should be removed.

[11.] And if again, not only can this be shown to have failed through special circumstances peculiar to itself, and which not only need, not, not after the warning itself affords, ought never to recur; but also that several other works on an equally extensive scale *(as regards operation)* have for a long series of years not only paid their way, but in every way, without exception, much more than answered all expectations, so that the revenue has in a very sensible degree been relieved by them, and thus a fair prospect been opened of removing existing taxes, then nothing can be clearer than the way to the extension of this most beneficient scheme throughout the length of India.

[12.] It will now, I believe, be fully allowed that upon irrigation and navigation alone depends the counteraction of famine, the increase of produce to any great degree, its removal at a practical cost to the Ports, and, consequently, to its proper markets, the increase of land and custom's revenue, the increase of our prestige through the contentment of the people, &c.

[13.] I cannot, therefore, conceive a more important question for the public determination of Government than this which I have above specified, and I respectfully submit that every facility should be given for the open expression of opinion, on this critical point, by every one whose duties, or other circumstances, have afforded him means of coming to conclusions on it.

[14.] This is not a mere matter of professional opinion; it is a great and essential point on which I am sure that non-professional men may satisfy themselves by hearing both sides of the question, and considering the arguments. What I urge is, that this work has failed solely from essential errors of projection, and that there is nothing whatever in the tract that would prevent works in it producing as great results as those in Madras. On the contrary, that it is in a considerable degree more practicable for irrigation and navigation than the Madras Deltas, first, in respect of the river to be controlled, the Ganges being quite a small one compared with either the Godavery or Kistna, and the tract through which the water had to be led being entirely free from any one obstacle worth mentioning.

[15.] Hence, that the works for the irrigation of a million acres there might have been executed for certainly one-third of what they have cost, that, consequently, they might have been executed in one-third of the time, and thus have been ready for the late famine, and have been yielding for 10 or 15 years 30 or 40 per cent.

[16.] If this is the correct view of the case, then those works might, and ought, to have been for many years the strongest argument for the extension of irrigation.

[17.] In the despatches on this subject, no mention is made of the encouraging success of the Madras works; they indeed appear to be denied when it is said—"We believe that very few engineering works of equal novelty of design and magnitude would be found to bear the test of actual experience with a more favorable result." This is repeated in the proceedings of Government on Captain Crofton's Report, and I cannot but observe that one of the Members who sign this Report had himself, as Governor of Madras, personally visited and satisfied himself respecting the results of the works there, and had minuted, in a very decisive manner, upon them. In that Minute he says—"works of irrigation create new value by an immediate and positive process, *with a profusion of which there is no other example*:" and—"In the Godavery and Kistna Deltas, the first difficulties have been overcome, and the primary and more expensive works have been executed; secondary works of distribution alone remain to be provided, *and these are so eminently profitable*, that if we have not means in hand to do them, it would be greatly for our advantage to borrow money for the purpose." Certainly, nothing has occurred since this Minute was written to cause the late Governor to change his mind on this point, and we must therefore conclude that, in saying in this Despatch that few other irrigation works could show a more favorable result than the Ganges Canal, which is in the state shown in these papers, he must be understood to mean something very different from what a superficial view of these works might convey.

[18.] And in the *Gazette of India*, signed by Colonel Strachey, Secretary, Department Public Works, and published there on the 7th January 1865, and by order of the House of Commons in England on the 1st of June, the results of the great works in Madras are thus given :—

Statement for 1862-63.

	Cost.	Net income, besides 4 per cent.	Per-centage.
	£	£	
Godavery Works	338,000	146,000	43
Kistna ,, ...	191,000	421,000	11
Cauvery ,, ...	58,000	107,000	180

[19.] In the Return, the results of the Upper and Lower Coleroon Anicuts are given separately, but I have added them together, because they in part formed one project.

[20.] This paper, published by the Government of India, is conclusive as to their opinion of the present results of those works being in full accordance with the late Governor's Minute.

[21.] I cannot but observe also that I am supported in this view of the case by the protest entered by one of the Members of Council saying—"I regret I cannot concur in so much of this Report as speaks favorably of the Ganges Canal."

[22.] In confirmation of the Returns published by the Government of India, I may also give the following, drawn from the Madras Administration Reports, as showing in a very conclusive manner the results of the Godavery and Kistna Works :—

	£
Average revenue of Rajamundry, Masulipatam, and Guntoor, from 1841 to 1845	470,000
Ditto for some tract under the new names of Godavery and Kistna for 1863-64	845,000
Increase ...	375,000

or 80 per cent.

* Besides 350,000 for head works, and completing the works generally, and still without the extension to Allahabad, making, besides the latter, a total of 4,00,000, including interest.

The adjoining Districts from 1841 to 1845—

	£
Vizagapatam	150,000
Nellore	230,000
Cuddapah	257,000
Bellary...	320,000
Kurnool	82,000
Total ...	1,059,000

The adjoining Districts for 1863-64—

Vizagapatam	186,000
Nellore	335,000
Cuddapah	223,000
Kurnool	182,000
Bellary	312,000
Total ...	1,238,000
	1,059,000
Increase ...	179,000

or 17 per cent., that is, while the revenue of the newly irrigated Districts, though the water is not yet *distributed* to half the lands, has increased 80 per cent., that of the adjoining Districts has only increased 17; and of this a large proportion is also due to irrigation, for there have been great improvements in those Districts, so that by this unquestionable comparison, $\frac{4}{5}$ths of the whole increase of 80 per cent. on the former revenue is due entirely to irrigation and navigation.

[23.] I cannot see how we can from this conclude otherwise than that if we keep these Madras works in view, (and there are no failures of great works there) they will completely relieve us from the desponding view to which the failure of the Ganges Canal has led the Government, when they conclude that better results than these could not be found, and, consequently, as we must infer, are not to be hoped for in future projects.

[24.] The failure of this great work has had a most injurious effect upon the public mind, and has most seriously shaken the confidence of those interested in India respecting irrigation, and I cannot but again respectfully suggest the great importance of a full and public investigation of this vital subject, that they may be satisfied there really is no ground for such desponding views, but that we have on the contrary the strongest grounds for judging that if we avoid the mistakes made in this case, we may and ought to boldly proceed, as the Madras Government express it in their proceedings of the 15th May 1858:—

"Further, the Government question whether considering that the returns from irrigation *are always considerable and often immense*," &c., * * * * "they express their strong, unanimous, and earnest advocacy that all irrigation works which, on a comprehensive view of the wants of the country, may be deemed necessary to develope its undoubtedly great resources, be commenced at once, boldly, and on a large scale, be pressed forward throughout all times and under all circumstances, and be looked on, and practically treated, as in fact they are, the most economical, because the most profitable in which the Government could possibly engage." * * * * "It is needless now again to bring forward the innumerable instances in which money has been most advantageously invested in this Presidency in irrigation works. The proceedings of Government have been only too vacillating and desultory, and it is confidently asserted that India could be placed in a position to pay all her own expenses, and discharge her debt far more readily and speedily than by any scheme of retrenchment and reduction."

[25.] Nothing can be more certain than that this could not have been written except under the pressure of the most decisive results; and it is grievous to think that though this is now seven years ago, the fundamental question of whether such a work as the Ganges Canal is a true type of irrigation works for India generally or not, requires still to be examined, nay, is concluded to be decided in the affirmative by the Council, with only one dissentient, and who considers the matter of sufficient importance to record his official protest against it.

[26.] I would on this point also beg to put this question of the returns of Government irrigation works in another form which seems to me the most correct of all, viz., by showing the general results of all the great works throughout India—

Cost of works up to latest date of which I have the records.

		£
Punjab	Ravee Canal*	...
	Western Jumna Canal... ...	169,000
North Western Provinces ...	Ganges Canal	2,882,000
	Doon ,, ...	47,000
	Eastern Jumna Canal	143,000
Madras...	Godavery Works	338,000
	Kistna ,, ...	191,000
	Pal'aur ,, ...	78,000
	Pennair ,, ...	25,000
	Cauvery ,, ...	58,000
	East Coast Canal	50,000
	Total ...	3,981,000

Net returns of above Works for the same years.

		£
Punjab	Ravee Canal	...
	Western Jumna Canal	23,000†
North-Western Provinces	Ganges Canal	16,000
	Eastern Jumna Canal	12,000
	Doon Canal	51,000
Madras	Godavery Works	159 000
	Kistna ,, ...	29,000
	Pallaur ,, ...	2,000
	Pennair ,, ...	1,000
	Cauvery ,, ...	107,000
		349,000

which, on a Capital of £ 3,981,000, is 8½ per cent. Thus even including the Ganges Canal, the result is exceedingly satisfactory. There are some other considerable works in Sindh which should be included, but I have no Returns; and there are innumerable small works in Madras, the results of which are much better than 8½ per cent., but the question here is about the results of large works. Thus, deducting the present interest of money, 5 per cent., the revenue gains a clear benefit of nearly £150,000 a year by these works, notwithstanding this terrible failure of the work upon which nearly $\frac{4}{5}$ths of the whole capital has been expended, and it must be recollected that most of these works are not nearly in full operation yet; when they are, and if the Ganges Canal is not really effectively reformed, there is every certainty of the returns of the whole being above 20 per cent., and the net gain to the revenue ¾ millions a year. It must also be remembered that these returns by no means show the whole profits to Government. For instance, the actual increase of revenue in the Godavery and Kistna is £370,000 a year, and I have shown that $\frac{4}{5}$ths of this is really due to the works, £320,000, and deducting 5 per cent., for repairs, there remains £300,000, while, as the returns are made out, they only show £188,000. The real direct returns into the Treasury is even now much above 8½ per cent.

[27.] I am sure this statement will bear thorough examination, and is substantially correct, so that when we take the Ganges Canal as the measure of our success hitherto, and of our prospects in further works, we see the matter in a totally false light.

[28.] The fact is, that the Ganges Canal, instead of being the true standard, is really the only large work that has failed out of the above list; the Doon Canals are a small work, and I see it is stated that there the water-rates ought to be doubled, as being far too low.

[29.] And with respect to future works, there is, of course, far less chance of a great failure, because we have now both the warning from that which has failed, and the example of those which have succeeded, and this is the grand advantage of extended experience.

* I have not been able to obtain this Return.

† Estimated at half gross income.

[30.] I beg respectfully to offer these remarks on the point which is incomparably of the greatest importance, viz., the results and prospects of irrigation and navigation generally.

[31.] I must beg, however, also to be allowed to answer the charges which have been brought against me by Captain Crofton.

[32.] I must first notice the way in which he treats my plan for the head of the canal below the Solani. He says, that if I carry the canal directly into the high ground, the cutting will be 96 feet deep, and the new head will cost 2½ millions, and this is concluded triumphantly with a note of admiration. But there is not a word in my papers that implies that I would have carried the head along a cutting of 96 feet for many miles, when there is low ground on the most convenient level immediately adjoining. And before his Report is sent in, this is pointed out by a writer in the "Times," though one would suppose it would not require that an Engineer, capable of re-modelling the Ganges Canal, should require to be told that, in cutting a canal head, a line requiring an impracticable amount of excavation should not be selected in preference to land of a suitable level immediately adjoining; yet, after being thus set right, he has left the first preposterous supposition in his Report, and this is deliberately repeated by the Secretary to Government in the Government Memorandum.

[33.] How easy it [? is] in this way to substitute for the simple and obvious proposal of an experienced Officer to lead the canal from the river below all the difficulties such an invention as this of cutting into the high land, as if I had proposed it, and then point out what an ignorant person I must be as if I had never cut a canal before.

[34.] I would only ask, is this a worthy way of dealing with a great public question? I cannot but bring this prominently forward. because it is indicative of the whole tone of the Report.

[35.] But Captain Crofton then proceeds to say that the canal carried along the low ground, £500,000 for 36 miles, or £14,000 a mile, but without showing the slightest grounds for estimating it at this sum, which is more than the rate of the first 100 miles of the present canals, led through all the great difficulties of the hill country, while this would not cross a single stream of any size. It certainly could not cost one-third of this sum, if projected upon right principles.

[36.] But the points I particularly wish to press in this part of the subject are these—

[37.] First, with respect to the competency of this Officer to deal with the case. It is certain that to correct a work originally constructed on false principles, so that it has entirely failed both as respects stability and returns, is a far more complicated case, and requires far more practical skill than to originate a project—just as it requires a far more able physician to restore a patient, whose disease has been dreadfully complicated by false management previously, than to prescribe for a case of simple illness at first—now I cannot but request attention to this point. An Officer first estimates the cost of leading a canal from a certain point in a river at 2½ millions. He then receives a hint about it from the "Times," and immediately reduces it by 2 millions, and just as recklessly estimates it at half a million. This was one of the simplest and most fundamental points on which a Hydraulic Engineer could be called upon to give an opinion. Now, it is not a question for Engineers only, but for any intelligent man, whether we should conclude that a man who is thus proved to be so very little conversant with the very matters upon which he is called to decide, as to require to be set right on so essential a matter, can possibly be competent to re-project this great work. To me it seems most surprising, that such extraordinary want of experience on the subject, as this implies (that he should suppose that a work would cost 2½ millions, which, upon a hint from a newspaper, he himself thinks could be done for half a million), should not have led his superiors at once to conclude that he was entirely out of his depth, and certainly not a man who could be safely trusted with the reformation of a work of such magnitude. The fact is, that the work would have cost neither 2½ nor half a million, but, perhaps, £ 100,000 or £ 150,000.

[38.] The second point is, that in thus estimating that a canal can be carried from the Ganges below the hills, on to the high ground of the Doab, for half a million, he surrenders the Malakoff of my opponent's whole position, and entirely decides the controversy in my favor.

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[39.] The present head has cost more than a million; if the high land could have been reached from a point below the hills for half a million, then more than half a million would have been saved, the cost of the works would have been reduced from 2 millions to less than 1½, more than one-fourth of the time would have been saved, the accumulation of interest and repairs would have been reduced half, the returns, five years ago, would have been about 1½ per cent., supposing only the present extent had been watered, then, the works would have been far better advanced to meet the famine, and by this time it would most certainly have been returning fair, if not high, interest.

[40.] Moreover, the works that have failed above Meerut would not have been executed, and thus the saving of this half million would have made the difference in every way between a failure and a success.

[41.] This alone, therefore, by my opponent's own estimate, settles the question of the work having failed, not from any real difficulty about irrigation, but solely from a palpable error in the projection.

[42.] I cannot but hope the Government will also allow me respectfully to bring before them the way in which my papers have been dealt with in this and in other cases. A controversy had arisen about this work out of a confidential paper which had been printed by some person in authority, without my permission, and my papers which followed, are submitted for the decision of an Officer, probably 25 years my junior, who had never seen a weir, or one of our great successful works in Madras. And his decision upon them, with every possible grounds for bias in his case, as well as entire ignorance of our principles of construction in Madras, is accepted as conclusive; the absurd calculation which he had made, because he totally misunderstood the case, notwithstanding his own correction of it, is repeated in this Despatch, and I am officially represented as so utterly ignorant of matters, about which I have been successfully employed for 40 years—as to propose a work which is palpably absurd, and impracticable as a remedy for the evils already resulting—and thus the matter is left without officially calling upon me to reply to these papers, and thus giving me an opportunity of rebutting this charge, and of showing what could be said on the other side. In the same way, on a former occasion, when I was ordered from Madras to report upon Cuttack, my Report, the fruit of long experience of the most unexceptionable kind, was submitted to a young man like Captain Crofton, with comparatively little experience at all, and none whatever in the principles of construction the paper referred to; and I believe when a book professing to contain the papers on the subject of Cuttack was printed by the Bengal Government, my paper was omitted; and the same was done with respect to the Toombudra Works in Madras—every paper written against me was printed and published, but mine was omitted.

[13.] I cannot perceive how the public service can be promoted by thus dealing with great public questions,—questions, indeed, of the very first importance to India and to England. If everything is to be heard and published on one side, and nothing on the other; and the latter, too, the side on which by far the longest and most successful experience is, I cannot but think the public service must suffer.

[44.] The third point is to endeavour to show distinctly what progress has been made, both in the question of the Ganges Canal, and also of Public Works generally, through the discussion which has been lately carried on.

1*st*.—As I have already observed with respect to the Ganges Canal, the main point of all [is] the practicability of leading off the water from the trough region, as it has been strangely called, clear of all the difficulties of the hill tract, and the fundamental difference it would make in the project is now fully granted.

2*nd*.—The use of stone in the works. It is stated that 1,400 cubic yards were to be ready in the hills by the 1st of last May, nearly half as much as would be required for the apron of a weir across the Ganges, so it is certain that we are no longer dependant upon brick masonry. The price stated is certainly enormous, Rupees 54 a cubic yard, but even this is by no means high

enough to make it advisable to run so great a risk as to use bricks in the overfalls, &c., and I feel fully assured that it will be found, that, if properly managed, the works will be eventually executed at a price far below the above.

3rd.—It is quite evident that the practicability of a weir across the Ganges in the open country is now fully accepted, and all the ideas of awful inundation, &c, entirely given up.

4th.—The fundamental principles originally insisted and acted upon, that navigation was a matter of very little importance in the project, is fully surrendered, and the work, it is allowed, ought to be made a thoroughly effective navigation,-that internal water transit is an absolute necessity.

Most of the remaining points are of much less importance, but they must all be surrendered before long. The one of most importance, the deep excavation which was one of the two great sources of waste of time and money, must have made a difference of another half million in the cost. Indeed, by far the greater number of minor mistakes which were denied in the former part of this controversy, are given up in Captain Crofton's Report, and allowed for in his plans for the re-modelling: and though not estimated for, yet the importance and practicability of continuing the navigation to Allahabad, instead of stopping at Cawnpoor, is also allowed in these papers. It is impossible to over-estimate the value of these points gained; especially the first, because it lies at the very root of the whole irrigation question for India. This point once clearly seen and fully allowed, as it is now by the former opponents, that a large portion of the expenditure, and consequently of the time, is solely owing to mistakes in the projection, entirely alters the whole face of the question. Even only half a million, as estimated by Captain Crofton, saved by beginning below the hills, as I have shown, removes even this project, the only one that could be quoted against irrigation, to the other side, and makes it an additional argument in its favor, as it would certainly convert it from a failure in respect of returns to a very profitable work. And when we take the real difference that the change of head would have made, viz., about one million, and add to it the saving of by far the greater part of accumulation of interest, &c., (for the works would then have been in profitable operation in half the time), it would certainly reduce the cost to about half of what it has been, and have placed it in one category with the Madras works as enormously profitable. For 1½ million acres of crop at a water-rate of Rupees 2, or £ 300,000, besides a very large income from navigation, suppose ½ pie ($\frac{1}{16}$ *d.*) on 1,000 miles, and one million tons and passengers, or £ 250,000, making a total of £ 550,000, on half the present capital, or 1½ millions would be 37 per cent. And certainly one million tons and passengers on such a navigation is far below what it would soon become at the prices at which they could be carried.

[45.] This calculation also does not allow for the saving in the excavation, which would have reduced the cost to one million, or one-third of the present capital, and that this a true calculation, at least that it certainly does not err on the side of too low an estimate, is most certainly proved by comparison with the cost of irrigation in Madras. The Kistna and Godavery Works together will irrigate two million acres of *rice* before a million is spent on them which is 10*s.* an acre of *rice*, and at this rate 1½ million acres of *wheat* in the Dooab would cost only ¾ of a million—even supposing that wheat required as much water as rice—and I can positively affirm that the Dooab is a much easier tract to water than the Deltas of the Godavery and Kistna. I am not surprised at men being startled at these calculations, but I am quite sure that if the reasons are calmly considered by unbiassed persons, whether Engineers or not, they will see that they are plain and undeniable, and such as it does not require professional men to judge of. For instance, who cannot see that the advantage over the Godavery Delta, in our having in the latter to deal with a river four miles broad, 30 feet deep in the freshes, and carrying 200 million cubic yards of water per hour, rather than the Ganges about half a mile broad, 12 feet deep, and carrying 20 or 25 million cubic yards. The two channels of the Ganges above Hurdwar, where the weir should have been built (if built in that neighbourhood), are only 400 yards broad, against 4,000, the united breadths of the four channels of the Godavery across which the masonry dam has been built. To show this in the simplest way, I give here sections of the weirs for the three rivers.

[46.] These are all on the same scale, and they put in a clear light the extraordinary nature of the ideas which have been entertained in the North-West as to the extreme difficulty of establishing a weir on the Ganges, and that if one were built, "the works would be breached and washed away with the violence of the flood"—and again, that, "if constructed similar to those in Southern India, they would inevitably fail on the first serious trial." The contrast between these unaccountable assertions, and the above sections, is something approaching to the ludicrous.

[47.] The dimensions here proposed for the Ganges weir, are those which the depth of water requires. The great depth of the Kistna, as here shewn, does not continue all across the river, but it shews what the work had to stand just the same as if it did. Now, with reference to the points thus gained in the controversy, might I not fairly expect that, having thus acknowledged that I was right in all these main ones, and my opponents wrong, that there would remain some suspicion that in the remaining ones, Madras experience might be best too, that it was thus a very serious question whether the whole project ought not rather to be "re-modelled" on the Madras principles, or at least that the Madras Officers should be fairly heard in reply to what is now proposed to be done.

[48.] Is it not more than probable that those who are now acknowledged to be wrong in their objections to the use of stone, to the leading the water from below the hills, are also mistaken in minor points?

[49.] I would also now beg to call attention to the ground gained in this discussion as to Public Works in India in general.

[50.] The first, and one also of incalculable importance, is the acknowledgment now first made in a Bengal Report, and tacitly allowed in the Despatch, that nothing but water can convey the great traffic of India. For 15 years not a word would be listened to on this great and fundamental point; a discussion of the question of land carriage, and whether it would meet the wants of the country, either in respect of cost or of quantity, was reprob[ated] in official papers, and tacitly submitted to by Government, as "adverse discussion," and now after a loss of so many years, and an expenditure of 60 millions on Railways, it is allowed that we have yet to begin upon a system of transit essential to the well-being of the country. It is now said that Railways cannot, or ever will be able, to carry the heavy and bulky raw materials which form the staples of commerce in a country like this, at sufficiently low rates, &c.; and the carriage of a ton of cotton by land from Agra to Calcutta, costing £17, is contrasted with the same carried 1,000 miles in the [?] for £1-14, and this is accepted by Government as the true state of the case. We have thus at length arrived at another great and essential principle, in the improvement of India by Public Works. Had this point been allowed to be discussed 12 years [ago?], all India would before this have been traversed by main lines of steam-boat canal, and assuredly an addition made to her income much beyond the whole amount of taxes she now pays. Still it is an amazing step gained to have reached this even now. The difference above given of about £16 a ton, for 1,000 miles, calculated on only 2½ million tons for all India, would make 40 millions sterling, equal to the whole of the taxes of India; and it is evident that 2½ million tons, carried 1,000 miles, is only a very small part of the traffic of the country. If only an average of half a million tons were carried on an average over the 4,000 miles *of Railway now being laid, they would cost the country 32 millions more than if carried along* 4,000 *miles of canal*, and this length of canal could certainly have been made for 12 millions, or at £3,000 a mile. But half a million tons is quite a small part of the tonnage that would be carried on the most important 4,000 miles of communication in India at water-rates; no doubt they would average three or four millions of tons besides passengers. This will give some idea of the loss that India has suffered from all discussions having been so long rejected in the question of communications.

[51.] I trust that this acknowledgment of the principle will not be considered sufficient, but that the subject of water-carriage will now be decidedly and vigorously taken up. There is one other main point that I wish to refer to in this letter—it is that of a weir at the head of the

canal. After all that has been said, and though all the three Engineers of longest experience are now quite agreed on the necessity of it, viz., Colonel Smith, Sir P. Cautley, and myself, Captain Crofton decides to reject it. It may be argued that he says "that the necessity has been acknowledged by all, &c." But the question here is not about what is said, but about what is done—saying that they are necessary, or saying that they are not, will not make the slightest difference; the canal will be unsupplied with water at the most critical times whichever of these two is said. The question lies between doing and not doing. Captain Crofton has rejected the weir from his estimates for re-modelling the canal, and in this his opinion is contrary to our united opinions. I must beg to urge this point upon the consideration of Government. Is the work thus to be left in a state in which it will most certainly fail in the terrible time of famine, as Colonel Smith shews it did in both years before from want of secure head-works?

[52.] I regret the great length of this letter; the points I have touched upon are all leading ones, and such as are at the very foundation of the material prosperity of India.

[53.] I shall not attempt to answer Captain Crofton's remarks on the details of the works I recommend, nor to give my opinion on the details of the works he recommends. But I consider my peculiar position with respect to Public Works, and my duty to the Government and to India, oblige me to give a very decided opinion on the proposed works generally, viz., that they are utterly defective, and will certainly leave the project in an inefficient state after two or three years' more delay, and an expenditure of another half a million; and that the whole project must be re-modelled, not on the old principles, but on the principles of the Madras works, those which have been proved to be sound principles by their wonderful success.

[54.] And certainly the one fact that I have already referred to, that on a simple fundamental point in projecting such works, Captain Crofton has been obliged to acknowledge, upon a word from the "Times," that the canal head, which he estimated first at 2½ millions, could be constructed for half a million, is quite sufficient to throw a doubt on his competency to extricate this now most complicated case from the mess it has got into. I cannot conceive that an Officer, who does not know so simple a thing as whether canal can be led from a certain point of a river to the surface of the country at a cost of 2½ millions or half a million, can be competent to deal with the far more intricate question of the correction of the evil of the work generally, nor how an Officer who has seen what can be done by works executed upon sound principles, but all whose experience has been in what is now proved to be a false school, can be the fittest man in India to deal with this most critical case.

[55.] I hope shortly to answer in detail Captain Crofton's remarks upon my suggestions, but in the meantime I would respectfully entreat the Government to consider further and near [more ?] the other side of the question before proceeding with the remedies proposed.

[56.] I have before me the original systematic estimate for this work, £600,000, including the extension to Allahabad, and to water 1½ million acres. There has been already expended upon it nearly two millions, and not half a million of acres have yet been watered; an estimate of more than half a million, without allowing for head-works, is now prepared, and even were the works so proposed effective, it would have then cost four times the original estimate, and yet leave the head-works and the extension of 120 miles to Allahabad to be executed, requiring more than quarter million more.

[57.] Is it not perfectly reasonable that, having arrived at such a crisis, we should not still without real investigation proceed merely to patch up the present works, but thoroughly review the whole project, and endeavour by calling in every experience we have gained to ascertain as far as possible what can yet be made of it?

[58.] For the encouragement of Government, I can most positively affirm that the project is yet perfectly capable of being made a thoroughly effective and highly navigable one, if only it is treated upon sound principles.

X 13

[59.] It must be remembered that, as yet, there has been no real discussion whatever as to the details of the works for "re-modelling"—they have been settled exclusively by Officers of the same school, all committed to the original principles, and all under the influence of the same local prejudices.

[60.] From my peculiar position now as the Officer of most experience in such works, I cannot but think it is my clear duty earnestly to protest against thus dealing with this work, and to put on record my opinion that the view taken of the case by Captain Crofton is, for want of the necessary experience, altogether superficial and unsatisfactory.

[61.] Especially I would call attention to the immeasurable mischief that will be done if this work is again left an inefficient navigation, either from the details of its arrangement, or from its stopping short of the point which is essential to its effective operation, viz., Allahabad. It ought, from its position, length, dimensions, &c., to be, without any comparison, the first communication in the world; as yet there is not a real steam-boat canal in existence, and this wants very little to fit it for steam navigation. It ought to be at this moment averaging two or three million tons of goods, and one or two millions of passengers per annum, at prices lower than have ever yet been seen in the world.

From the Colonel Commandant, Madras Engineers, to the Secretary to Government of India, Public Works Department, dated 16th November 1865.

[1.] I regret to find that, in my letter on the Ganges Canal papers of the 9th instant, I made a mistake in stating that the original estimate of the works was £ 600,000; I see that this was for the line that was afterwards rejected, viz., the circuitous one avoiding the aqueduct; but that for the line, including that work, the amount was £ 720,000, including £56,000 for Ghât revetments, and also including the extension to Allahabad.

[2.] On the other hand, I find now that the present estimate of £100,000 does not allow for the completion of the works. The total probable expenditure therefore, is, according to these papers, as follows:—

	£
Expended up to April 1863	2,040,000
Present estimate...	390,000
Completing present works and permanent head-works ..	540,000
	2,970,000
Add for extension to Allahabad, suppose 120 miles, at £ 2,000...	240,000
	3,210,000
Add accumulation of simple interest, &c., to the present time...	830,000
Do. for two years while the "re-modelling" is carried out, or 10 per cent.	320,000
Total ...	4,360,000

Thus the total cost of the works, if the present estimate is found sufficient, will be 3¼ millions, besides interest, or nearly five time the original estimate, which was for the same extent of land, viz., 1½ million of acres, and yet, if that extent is irrigated, and the rates now ordered, are charged, viz., Rupees 2½, the gross receipts for irrigation alone will be £340,000, or 8 per cent., and deducting 3 per cent. for repairs, &c., it will leave a net income of 5 per cent. on this work taken by itself.

[3.] But it will include 1,000 miles of navigation on the main line and principal branches, and if only one million of tons and passengers are carried on an average over the whole length, at a toll of ¼ pie ($\frac{1}{384}$ *d.*), the returns would be—

	£
Irrigation 1½ million acres, at Rs. 2½	310,000
One million tons and passengers carried 1,000 miles at $\frac{1}{384}$ *d.* ...	130,000
	470,000

or 11 per cent. Thus even upon the present plan of proceeding, if the works succeeded, the result would be entirely satisfactory even with a very light toll.

[4.] But if the project is thoroughly reviewed, it will be found that a very great increase of water might be led over the country with a very small proportion of increase of cost, so that the returns might greatly exceed the above.

[5.] I may here also point out a source of error in comparing this work with the Madras ones, which does not appear from any of the papers. And it is this, that, in the Bengal papers, a million acres means not so much *land*, but so much *crop*; thus it will be, pehaps, as in the Eastern Jumna Canal, 400,000 acres of the monsoon or Khurreef crop, and 600,000 of the dry season or Rubbee crop. But in Madras, we mean one million acres of *land*, of which any proportion may be irrigated for a second crop, so that a million acres with us may mean 1½ million acres of crop, or more. The Ganges Canal is thus only calculated to irrigate at one time about one million acres of *wheat*, while the Godavery works are calculated to irrigate more than a million of *rice*, and the Kistna works something under a million.

No. 641. ORDER THEREON, 27th March 1866, No. 1,007.

CIVIL WORKS, No. 81.

Ordered that the following letter be sent:—

(Here enter No. 1,008, dated 27th March 1866.)

(True Extract.)

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

Exd. S. T. Augustin.

PUBLIC WORKS DEPARTMENT.
FORT SAINT GEORGE,
27th March 1866.

No. 1,008.

No. 642.
To

THE SECRETARY TO THE GOVERNMENT OF INDIA,
PUBLIC WORKS DEPARTMENT.

SIR,

CIVIL WORKS, No. 82.

1. In compliance with the request contained in the Proceedings of the Government of India under date the 24th February 1866, No. 205C, I am directed to state that the Governor in Council does not concur in the opinion which is expressed in paragraph 13 of His Excellency the Governor General's observations that the success of canals and other irrigation works is due to other than engineering questions, and he sees no advantage to be gained from establishing the system of inspection and cross reporting by Officers trained in different parts of India, which is suggested as a means of clearing up all the differences and doubts which have arisen on the subject of irrigation works. His Excellency believes that a straightforward and clear statement by the Officer employed upon any particular work is sufficient to give ample information to an Engineer, to enable him to judge of its principles and details, and he is of opinion that reports from Officers designedly selected for their want of local knowledge would be comparatively of no value.

2. The probable result, besides the waste, for the time, of the services of the Officer employed, who might be more profitably engaged in his own Presidency, would be criticisms and discussions which would occupy much time and lead to no practical good.

3. If the opinions of Officers possessed of special experience are required in any of the Presidencies they may be easily obtained as in the present case of the Ganges Canal.

I have the honor to be,
Sir,
Your most obedient servant,

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

Exd. S. T. Augustin.

No. 205C.

GOVERNMENT OF INDIA.

PUBLIC WORKS DEPARTMENT.

Civil Works.

Agricultural.

FORT WILLIAM, FEBRUARY 24, 1866.

Sir Arthur Cotton's strictures on the scheme for remodelling the Ganges Canal.

Read again :—

The Resolution in this Department, No. 227 C, dated 27th February 1865, on Major Crofton's Scheme for remodelling the Ganges Canal.

A Despatch from Her Majesty's Government, No. 34, dated 30th June 1865, approving of the carrying out of Major Crofton's project.

Read :—

Two letters from Major-General Sir Arthur Cotton, Kt., dated 9th and 16th November 1865, on the subject of Major Crofton's project.

OBSERVATIONS.—The project prepared by Major Crofton, R. E., for remodelling the Ganges Canal, was approved by the Governor General in Council in the Resolution of the 27th February 1865, and has since been sanctioned by the Secretary of State.

2. In according the approval of the Government of India to this project, the objections of Major-General Sir Arthur Cotton were considered, and it was determined by the Governor General in Council that there appeared to be no sufficient *primâ facie* reason for abandoning the upper section of 100 miles of the Ganges Canal, in order to adopt a head for the Canal lower down the Ganges, as proposed by Sir Arthur Cotton. It seemed to the Governor General in Council that the case was so far clear, that it was not worth while further to pursue the project for the dam across the Ganges below the junction of the Solani, with new head-works and line of Canal to join the existing line. No further action was therefore taken on this proposal, but reasons were given why the Government of India considered that Sir Arthur Cotton may have misapprehended the state of the case.

3. The decision come to was submitted to Her Majesty's Government in England, and was approved. It was presumed that had it been considered, necessary, notice of the course of action taken would have been communicated to Sir Arthur Cotton from the India Office.

4. Sir Arthur Cotton has since addressed the Secretary to the Government of India in this Department, complaining of the manner in which his proposals have been treated, and still urging the Government of India to consider the subject further, before adopting finally Major Crofton's project; and he gives his reasons for not placing confidence in that Officer's results.

5. While the Government of India regret that so much personal feeling should have been imported into this question, and although there still appears to the Governor General in Council to be reason to suppose that Sir Arthur Cotton may have misapprehended the state of the case owing to his not being aware of local circumstances, still it is fully admitted that the opinion of so distinguished an Engineer is deserving of the most attentive consideration. Whether in view to the right guidance of the Government, or to the satisfaction of the public as to the course it may determine to pursue, it seems right that the matter should be further investigated.

6. The Governor General in Council therefore resolves to convene a Committee of impartial Engineers to report upon the propriety of proceeding, as previously determined, with Major Crofton's project, which is now in progress of being carried out. On the report of this Committee, the Government of India will be able to decide whether to go on with Major Crofton's project, or to stop its progress pending the preparation of a detailed project after Sir Arthur Cotton's views, with a comparison of the cost and advantages of that project with those of Major Crofton's project.

7. In order to ensure, as far as possible, impartiality in the Committee, the Government of India has determined to exclude on the one hand Officers whose training in the engineering of irrigation works has been acquired only in Northern India, and on the other hand also those who are known to hold strongly opinions concurrent with those of Sir Arthur Cotton. But still it is desirable to include amongst the members Officers fully acquainted with the irrigation system of Southern India.

8. The Governor General in Council, therefore, selects the following Officers:—

Colonel E. Lawford, R. E., of the Madras Esta blishment, Chief Engineer of Mysore, an Officer of 35 years' service in the Madras Presidency and in Mysore, and of long experience in irrigation works.

Lieutenant-Colonel J. C. Anderson, R. E., of the Madras Establishment, Consulting Engineer to the Government of Madras, in the Railway Department, and who has served both in the Punjab and in the Madras Presidency, and is acquainted with the irrigation system both in Northern and Southern India.

Lieutenant-Colonel Fife, R. E., of the Bombay Establishment, an Officer well-known for his experience in irrigation works in Sindh and Western India.

Mr. Sibley, Chief Engineer of the East Indian Railway in the North Western Provinces, whose services have been placed at the disposal of the Government of India for this purpose by the Agent of the East Indian Railway.

Mr. H. Leonard, C. E., Superintending Engineer, South-Eastern Circle, Bengal.

9. The Committee will meet at Roorkee. Colonel Lawford will be appointed President, and the Committee will make its report to the Government of the North Western Provinces, in order that it may be submitted to the Government of India with the opinion of His Honour the Lieutenant Governor.

10. Major Crofton will attend the Committee to explain his project, and the Committee will also be able, if it be considered necessary, to take the evidence of Lieutenant-Colonel Dyas, the Chief Engineer of Irrigation Works in the North Western Provinces, and of Colonel Rundall, R. E., who reported jointly with Sir Arthur Cotton on the Ganges Canal, and of any other Officers whose opinions it may be desirable to take.

11. It is probable that the Committee will not be able to meet before the middle of March, but of this due notice will be given. In the meantime, the several Officers have been warned.

12. Instructions have also been issued to the Government of the North Western Provinces to prepare at Roorkee, for the information of the Committee, the records of surveys and levels, and to cause such additional lines of levels to be taken as may appear desirable to lay before the Committee. Aided by these, the Committee will, it is expected, be able, within a few weeks, to examine the country and pronounce upon Sir Arthur Cotton's proposal, so far as to decide the question as to the propriety of causing a detailed project to be prepared or not.

13. In connection with this subject, it is observed by the Governor General in Council that, although Sir Arthur Cotton's objections are based mainly on engineering questions, the degree of success attainable in the construction of Canals and other Irrigation works, is due in a great measure to matters unconnected with engineering, and depending on climate, soil, the system of agriculture, and the habits of the people. These differ materially in Northern and Southern India, and the differences in opinion which appear between the Engineers of the two regions, arise, doubtless, in some measure, from want of full knowledge on these points, as well as from want of familiarity with the local physical geography.

14. It would doubtless conduce much to clearing up differences and doubts upon the subject of Irrigation works if Officers familiar with the system in Northern India were deputed by the Government of the North Western Provinces and the Punjab to report on the works in the Madras Presidency; and, similarly, if Officers from the South were deputed by the Government of Madras to inspect and report upon the works of Northern India.

15. The Government of India invites the attention of the Governor of Madras in Council, and of the Lieutenant Governors of the North Western Provinces and the Punjab, to this subject, and will be ready to receive proposals for deputing Officers for the object indicated.

ORDER.—Ordered, that a copy of the foregoing Observations be forwarded to the Government of the North Western Provinces for information and guidance.

Also to the Governments of Madras and the Punjab.

Ordered also, that copies be forwarded to the Governments of Bombay and Bengal, and the Chief Commissioner of the Central Provinces, for information.

Ordered further, that a copy be forwarded, to Major-General Sir Arthur Cotton, as a reply to that Officer's letters entered above.

W. Dicken *Lieut.-Col., R. A.,*
Secy. to the Govt. of India.

To
The Secretary to the Govt of Madras
Public Works Department.

Public Works Department.

PROCEEDINGS of the MADRAS GOVERNMENT

Under date the 27th March 1866

Read the following

From the Secretary to the Govt of Madras P.W.D.

(Recd under No. 208 dated 28th February 1866)

Criticism of the opinion of Officers of Rank & Experience in India is not unusual, but it is rarely indeed that it comes from Officers of the Indian Public Works Department. Such criticism is the more remarkable in the present instance, because the opinion criticised was recorded by Officers who have had the best opportunities of forming a correct judgment on the subject, and who have had no motive for doing otherwise than state their honest opinions.

Under these circumstances the Government is constrained to regard the criticism as unfounded.

Dated 23rd March 1866. No. 26
Recd 14th March 1866. No. 16

No. 1002

GOVERNMENT OF INDIA.

PUBLIC WORKS DEPARTMENT.

CIVIL WORKS.

To The Secy. to the Govt of Madras P.W.D.

No. 208 - C.

Dated February 24, 1866.

Received 10th March 66

Encl: one

Nos. 1007 - & 1008 - 27th March 66

Question of the expediency of proceeding with Major Crofton's project for re-modelling the Ganges Canal, or of stopping its progress pending preparation of a project after Sir Arthur Cotton's views.

For Orders

I do not see that any information will be gained other than direct to the increase of knowledge on the part of the Officer appointed to report, even if the opinion of the Gov Gen in Council correct that the opinion of Sir Arthur Cotton is due in great measure to the Engineering works is due in great measure to his unacquainted with Engineering. but in matters unconnected with Engineering. but I believe that opinion to be essentially erroneous as I believe that opinion to be essentially erroneous. It seems to me to be also the best reason for incurring the expense of such a system of cross reporting - an honest and clear statement by the Officer employed upon any particular work would give ample information to enable him to judge and orders of Govt. the principle and details of any work -

Circulated for

I concur in the opinion recorded by Sir H. Durand. I think that no reports from Officers corresponding to Colonel Crofton's should be called for, unless the Secretary of State for India should desire to have the opinion of the Engineers to be employed, who might be more profitably employed in their own Presidency, towards

General's observations that the success in of Canals and other Irrigation works is due to other than engineering questions, and he sees no advantage to be gained, from establishing the system of inspection and consequent reporting by Officers trained in different parts of India which is suggested as a means of clearing up all the differences and doubts which have arisen on the subject of Irrigation work. His Excellency believes that a straightforward and clear statement by the Officer employed upon any particular work is sufficient to give ample information to an Engineer, to enable him to judge of its principles and details, and he is of opinion that reports from Officers designedly selected for their want of Local Knowledge would be comparatively of no value.

The probable result, besides the waste, of the time, of the services of the Officers employed, who might be more profitably engaged in this or in Presidency, would be criticisms and discussions which would occupy much time and lead to no practical good.

If the opinions of Officers possessed of ~~Special~~ certain experience are required in any of the Presidencies they may be easily obtained or in

with the present case of the
Ganges Canal

First Sheet
27th March/66

Sent 28 March

A640@842

P. W. 1866. Department.

Extract of Govt. Order March

No. 1007 & 1008

Proceedings of Government of Madras

Dated 27th March 1866

The Government of India furnishes with the opinions of this Government on the subject of Ganges Canal.