MRO 1—77,006—8-6-37.

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(3) Initials of the Referencer_____

A-D

MADRAS RECORD OFFICE.

Government of Madras.

Public works DEPARTMENT.

G.O. No. 2089	Press / Mis.
154-55	
Dated 15 8	1871.

Not to be folded or roughly handled

Proceedings of the Madras Government, Public Works Department, 15th August 1871.

No 154. Read the following letter from Captain A deC SCOTT, R E, for the Acting Chief Engineer for Irrigation, to the Secretary to Government, Public Works Department, dated Madras, 15th July 1871, No. 46 —

I HAVE the honour to forward herewith a letter, No. 234, dated 29th May 1871, from the Agent and Manager of the Madras Irrigation and Canal Company, enclosing a communication from the Chief Engineer of the Company in reference to G O, No. 1,089, of the 18th April, and a general report on the objects of the original Toombudra project, and the ultimate prospects of revenue.

2 With regard to the first named document, I have not much to remark Mr Latham assumes that the capacity of the works for discharge of surplus water on the Godavery canals was calculated by means of a certain empirical formula, and appears to be of opinion that as the provision of similar works on the Company's canal corresponds nearly to what would have been obtained by calculation in the same manner, therefore that provision was not, as stated in the G. O referred to, based on erroneous data.

When a rule of the kind mentioned was laid down it was of course never intended that local circumstances of soil, geological structure of the country, and other features should be disregarded, and it does not follow that what was right in one case would be right in the other. In one locality a great portion of a given rainfall might be absorbed by the ground, in another very little, and water might in one place run off in a few hours, while in another it might stand for days But it is in fact the bad condition of the canal itself which influences the question more than almost anything else, and renders it so necessary to guard against any considerable accumulation of water in it by providing a great length of calingulahs at a low level, so that in assuming that a fall of 12 inches of rain in 12 hours would breach the one canal as certainly as it breached the other, the assumption is also made that the Godavery canals are in same state as the Company's, which one may be permitted to doubt.

3. With reference to the Chief Engineer's statement, that he proposes to test the canal in the way described by the G. O., I need only direct your attention to that part of my report on the Company's works, dated 6th July 1871, (now before Government,) which bears on this question.

Mr. Latham's views as to the advisability of testing the works seem to have been modified since writing the letter now under review.

4 In the report accompanying his letter, the Chief Engineer describes the scope of the Toongabuddra project to have been—

I —To utilize the waste waters of the Toongabuddra, giving *security* to 50,000 acres in Toongabuddra valley and 300,000 in Koondaur. Of the total areas commanded probably 200,000 may be cultivated with wet crops All existing wet cultivation excluded.

II —To store on the tributaries of the Toongabuddra about 2,200 millions cubic yards for second crop cultivation, of which about 1,500 millions would be available for use.

III.—To supply to the Pennair basin below the confluence of the Koondaur with that river 120,000 cubic yards per hour throughout both irrigation seasons.

IV.—The canal from the Toongabuddra to be made navigable and to be connected with the East Coast Canal, thus giving four districts communication with the metropolis

5. It is stated that had the object of the works been confined to irrigation only, as described under the first three heads, it could have been attained at half the cost of the present canal, and the items of reduction are marginally detailed in the Chief Engineer's letter. It is added that when the Board of Directors proposed to reduce the size of the canal and locks in a degree which would even then have been more than ample for local traffic, the Government of Madras declined to accede to their proposal, and it is further observed that in its present condition the canal is only in a condition to accomplish the first named object.

6. In the present state of the works it seems idle to enter into any discussion with regard to the saving which might have been effected had navigation not been one of the objects in view when they were undertaken. The question of the reduction of the size of the locks also was fully investigated, and the decision of Government, recorded in the Proceedings quoted in the margin, was based on a full report from the Consulting Engineer, which showed that the whole saving which would be effected by the adoption of the proposition was only Rupees 4,40,000, while the objections to it were weighty

19th September 1867, No. 2,902

7. Assuming that the works, as they stand at present, can irrigate as wet crop or secure by periodical flooding dry crop on a total of 350,000 acres of land, the Chief Engineer proceeds to make the following calculation of revenue as it will stand within ten years from the present time —

200,000 Acres, wet crop	.	Rs.	12,00,000	Revenue.
150,000 „ dry „	... .	„	1,50,000	„
350,000	Total Revenue	Rs	13,50,000	„

or nearly 8½ per cent. on the expended capital.

8. Government are fully aware of the actual state of the Revenue Account of the Company, and probably will hardly endorse the views of the Chief Engineer, as to prospective returns, which are, it seems to me, liable to be characterized as exceedingly sanguine by any one who has witnessed the slow development of irrigation under completed works in other localities. But even if this estimate is accepted, the additions which have to be made to the debit side of the account for guaranteed interest on capital paid or to be paid, and for establishment, maintenance, and repairs, render it not a very favourable exposition of the results of a scheme viewed formerly as of so much promise.

From the Agent and Manager of the Madras Irrigation and Canal Company, to the Chief Engineer for Irrigation, dated Madras, 29th May 1871, No 234.

With reference to the Order of Government of the 18th ultimo, No 1,089, I have the honour to hand you a letter which I have received from the Chief Engineer (No. 679, of the 22nd instant,) together with copy of his general report

Proceedings of the Madras Government, Public Works Department,
15th August 1871.

From the Chief Engineer, to the Agent and Manager of the Madras Irrigation and Canal Company, dated Kurnool, 22nd May 1871, No 679.

In reference to G O, No, 1,089, of 18th ultimo, I have the honour to report that the canal between Kurnool and Cuddapah will be complete on 1st June next, and will be opened on that date.

2 I am not quite certain to what "erroneous data" paragraph 2 of that G O. refers I do not see that the data on which was fixed the capacity of permanent works intended for the escape of surplus water due to floods are proved *erroneous*

3 On the Godavery canals, where the average rainfall is much larger than that* at Kurnool, and is not spread over so many months, such works are (I am informed) made capable of discharging a number of cubic yards of water per hour equal to 75,000 times the square of the cube root of the area drained in square miles This is, as nearly as can be calculated, what is provided in the Company's canal for areas of between 20 and 46 square miles. For areas exceeding that it is less, for smaller areas it is more A rainfall of 12 inches in 12 hours would breach one canal as certainly as it breached the other

* *Sic*

4 In reference to paragraph 3 of that order, I am glad to report that the staff sanctioned for maintenance is now sufficient to meet all the risks enumerated, except any faults from uneven settlement and cracking of banks not yet discovered The substitutes for ordinary canal banks are raised to the level recommended by Government I hope to meet the Consulting Engineer here next month to re-consider the drainage areas and capacities of the canal

5 I propose to test the canal, in the way described by the G O as soon after the 1st proximo as the canal can be filled I cannot *make* a flood, but if we are so fortunate as to have two days ordinary heavy rain while the canal is full, that will secure the test No II. desired by Government The testing will require an additional staff, and I propose to retain some of our best hands for a month during its continuance

6 The time seems appropriate for enclosing a memorandum of the condition of the canal and prospects of revenue, and I therefore do so.

REPORT

The portion of canal now constructed is about 100 miles in the centre of the Toongabuddra project

2 The design of this canal needs careful attention, and may be briefly described as including the following objects —

I —To utilize the waste waters of the Toombuddra for giving *security* to the crops of 50,000 acres in the Toombuddra basin, and 300,000 acres in the Koondaur valley. Of these total areas commanded by the present canal, it is estimated that 200,000 acres may probably be cultivated with wet crop profitably, and that the canal will be also able to flood such portions of the remaining 150,000 acres of dry crop as may ordinarily require it I exclude all existing wet cultivation

II —To utilize in an exactly similar way but for the second crop, 1,500 million cubic yards of water intended to be stored* in reservoirs on the tributaries of the Toombuddra

* The quantity required to be actually stored in order to supply this is by the most liberal estimate 2,200 millions

III —To supply to the Pennair basin, below the confluence of the Koondaur and Pennair, 120,000 cubic yards of water an hour from the Toombuddra during the first crop and from the reservoirs for the second crop.

IV —Had the above been the only objects they would have been obtained at something like half the cost of the present canal A total of 61 miles would have been omitted,† the Pennair anicut saved, 55 miles of canal‡ might have been made in lengths smaller at their head, steeper in slope, and, instead of being maintained at full size, would have gradually decreased to nothing as the water was dispersed in branch channels over the country. The expense of the first 74 miles would have been also reduced by increasing the speed of the water, and decreasing the width in the heavy rock cuttings and over the aqueducts All locks would have been saved, and more than half the cost of the bridges But the design has included the making of the canal navigable of a size and with conveniences ample for supplying the wants of four districts, and connecting them with one another and the metropolis It was indeed proposed by the Board to reduce the size of the canal and locks, which would even then have been more than ample for local traffic, but the Madras Government declined to accede to this proposal

† Namely, 80 to 94 = 14 Miles
117 to 145 = 28 ,,
171 to 190 = 19 ,,
61

‡ Namely, 74 to 80 = 6 Miles
94 to 117 = 23 ,,
145 to 171 = 26 ,,
55

3 Such being the character of the design of the present work as constructed, it is nevertheless only in a condition to accomplish the first named object, No 1.

4 The other three objects must be in abeyance until the completion of other parts of the project bring them within reach

5 Taking the present work, so far as it applies to the first object only, its peculiar suitability is manifest It is *capable* of irrigating 140,000 acres of *paddy*, without stopping any of the supply intended for Nellore. Paddy is the wet crop which takes most water (excepting sugar, which is out of the question under a six months' supply of water), and experiments indicate that when water is used to most effect for paddy 1½ cubic yards per acre per hour are completely expended, but it is convenient to allow 2 cubic yards an hour to be run on in practice unless water is scarce, especially if the surplus can be utilized It is certain that paddy will not be the only wet crop grown, and that wet raggee, chillies, betel, etc, will be also grown, so that the promoters of the Company may reasonably hope for an ultimate wet cultivation of at least 200,000 acres In order to give a fair chance of utilizing the surplus water run off the fields, or stored in the canal, there should be as much dry crop as wet under the canal It is true that wet crop pays more than dry; but then a canal capable of irrigating 200,000 acres of wet crop has the capability of *flooding* 200,000 acres of dry crop also, without damaging the rice crop at the cost of enforcing on the farmers a little more prudence in the use of water than they like for one or two days Even if one flooding a week were required for dry crop on the 150,000 acres available, my opinion is that the ordinary supply of the canal would suffice to meet the demand without injury to the 200,000 acres of wet crops. Such a demand would suffice for a dry crop if rain entirely failed. Usually a single flooding to fill the heads, and perhaps one to enable ploughing to go on, would be all that would be needed.

6. The Koondaur valley is celebrated for its dry crops of cotton, cholum and indigo, and at the same time is a country in which every village has its wet irrigation for chillies, onions, tobacco, turmeric, etc, and every ryot knows how to grow rice No application for water for dry crop has yet been made for, indeed, the whole of the land on the narrow strip hitherto irrigated is kept moist by the canal water I do not expect the demand for flooding dry crop to be of rapid growth, it is a new idea to the natives, and I see that the use of water for dry crops has a very slow growth on some of the canals in the north of India. But every cultivator of wet crops by means of wells, so soon as canal water is supplied, leaves his well alone and takes canal water So far from fearing a discontinuance of supply, he would in the penny-wise manner of the Hindoo rather chuckle if a failure of the supply for a time drove him back to his wells and enabled him to claim remission of water-rate This, apart from any *speculation*, ensures a *trial* of the canal water wherever it is supplied, and if the supply prove constant every ryot will wish to make his

Proceedings of the Madras Government, Public Works Department,
15th August 1871.

profit from it, and water will be rapidly taken. I expect the canal to pay its expenses in the second or third year, and that after that the returns will increase more rapidly, so that it is certain to pay 5 per cent. before the tenth year, and probably more.

7 It is natural that the local revenue officers feel diffident at the crisis of so great an experiment, and are apt to fear disappointment, and on this account I consider the opinions formed by competent men experienced in irrigation *before* the works were commenced as far more trustworthy on the question of waters being used by the ryots than more recent opinions Nothing has happened to cause a change of opinion, and our works have not had more accidents than others in Godavery, Nellore, etc

8. Upon my estimate above given the limit of remuneration of the present work is :—

For 200,000 acres, wet crop	..	...	... Rs. 12,00,000
,, 150,000 ,, dry ,,	...	..	.. ,, 1,50,000
			Average ,, 13,50,000

350,000 total area secured from loss of crops.

9 The fact is that the area of *arable* land commanded has proved less than was expected Not only is irrigation north of Bowanassy found unsuitable, but in the 6th and 9th sections difficulties have occurred to confine the area commanded by the canal works to less than was estimated at the time when the proportion of water-supply suitable to the different districts was fixed. Hence if we suppose all the water which can be supplied by the present works to be utilized, in which case 120,000 cubic yards of water an hour run on to Nellore, the proportion of dry crop under the canal will be rather meagre Were the present canals enlarged so as to carry and distribute this extra 120,000, the disproportion would be increased, and the value of the canal as a security from famine would be no greater than at present

10 The cost of changing dry cultivation into wet has, I see, been exaggerated Ryots *do* plough rice land with the heavy bullocks used for dry crops, and *do* plough for rice with common ploughs, and need manure rice no more than they do dry crop.

11. The mode of working the distribution is as follows :— The "Draft Rules" Nos 1 to 5 and 8 to 9 have been found inconvenient by the Collector and are abandoned or modified, and the following simple process is adopted :— The Company's officers let a ryot take water as he likes, they make channels and supply water whenever the ryot asks for a supply; and they keep their own record An Engineer of the Company is appointed by the Agent to meet the Collector yearly, and the two accounts are then compared, and the remissions settled, and no difficulty has occurred hitherto. The ryots have the usual facilities for applying for water or remission *through the Collector if they like*, and such applications are referred by the Collector to the Company's officers.

12 To stop the scheme as it now is would not only leave useless the capital spent or guaranteed by this country for the 2nd, 3rd, and 4th objects I have described at the beginning of this memorandum. However equitably the Government should deal with the proprietors and their officers the transference of the work to Government (even if it were to be carried out entirely) would, I am convinced, shake the confidence of capitalists in the value of the work as an experimental exhibition of private capital in India The known liberality of the Indian Government justifies me in hoping that it will be believed that I give my judgment apart from any feeling of personal interest. It is unfortunate that schemes of irrigation, which are the first necessity towards developing wealth and enterprise in this country, seem especially entangled with the Governmental taxation of land, but I believe that the entanglement is more imaginary than real, and that private enterprise will rapidly extend to speculations entirely unconnected with Government. Money is already obtained and *spent* by the natives with twice the freedom which existed in 1861, and if improvement and confidence go on at the rate it has maintained since then we shall not find 100 millions

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15th August 1871.

of people content ten years hence to live in mud built huts, with leaky roofs, without a road in the country passable by an ordinary English carriers' waggon.

(Signed) J H LATHAM,
Chief Engineer.

No. 155. ORDER THEREON, 15th August 1871, No. 2,089.

IRRIGATION, No. 11. ORDERED to be recorded

(True Extract.)

Captain, R E.
Under-Secretary to Government.

Exd. E. C. Shunker.

MEMORANDUM.

5166

REQUESTED for reference the under-mentioned papers

Original Letter submitted with the Letter of the A. Chief Engineer for Irrigation dated 5th July 1871 No. 46 and B. O. passed thereon. on the latter

OFFICE OF THE CHIEF ENGR FOR IRRIGATION, P. W. Department, 18 May 1872.

D. W. Hawkins
Head Clerk.

To
The Registrar of the P W. Secretariat

Office of the Chief Engineer for
Irrigation and Joint Secretary.

No. 46 to Government.

Madras 15th July 1871.

From The Acting Chief Engineer for
Irrigation and Joint Secy. to Govt.

To The Secretary to Government
Public Works Department.

Sir,

I have the honor to forward herewith a
letter No. 234 dated 29th May 1871. from
the Agent and Manager of the Madras Irrigation
and Canal Company enclosing a Commu-
nication from the Chief Engineer of the Com-
pany in reference to C.L. No. 1089 of the
18th April and a general report on the
objects of the original Tonneladra project
and the ultimate prospects of Revenue.

2. With regard to the first named document
I have not much to remark. Mr. Latham
assumes that the capacity of the works for

discharge of surplus water on the Godavery Canals was calculated by means of a certain empirical formula and appears to be of opinion that as the proportion of similar works on the Company's Canal corresponds nearly to what would have been obtained by calculation in the same manner, therefore that provision was not as stated in the G.O. referred to based on erroneous data.

When a rule of the kind mentioned was laid down it was of course never intended that local circumstances of soil, Geological structure of the country and other features should be disregarded and it does not follow that what answers in one case will suit the requirements in another. In one locality a great portion of a given rainfall might be absorbed by the ground in another very little and the water might in one place run off in a few hours while in another it might stand for days. But it is impossible that the last condition of the Canal itself which influences the question more than always

anything else can renders it necessary to guard against any considerable accumulation of water in it by providing a great length of Cahinjallahs at a low level so that in assuming that a fall of 12 inches of rain in 12 hours would breach the one canal as certainly as it breached the other, the assumption is also made that the Godavery Canals are in the same State as the Company's which one may be permitted to doubt.

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Mr. Latham's views as to the advisability of testing the works seem to have been modified since writing the letter now under review.

4. In the report accompanying his

letter the Chief Engineer describes the scope of the Tungabudra project to have been:-

I. To utilize the waste waters of the Tungabuddra giving security to 50,000 acres in Tungabudra valley & 200000 in Koondaar of the total areas commanded probably 200000 may be cultivated with wet crops. All existing wet cultivation Excluded.

II. To store in the Tributaries of the Tungabudra about 2,200 millions Cubic yards for second crop cultivation of which about 1500 millions would be available for use.

III To supply to the Pennair Basin below the confluence of the Koondaar with that River 120000 Cubic yards per hour throughout both irrigation seasons.

IV The Canal from the Tungabudra to be made navigable and to be Connected with the East Coast Canal thus giving a direct communication with the Metropolis.

5. It is stated that had the object of the works been confined to irrigation only as described under the first three heads it could have been attained at half the cost of the present Canal and the items of reduction are marginally detailed. It is added that when the Board of Directors proposed to reduce the size of the Canal & Locks in a degree which would even then have been more than ample for local traffic the Government of Madras declined to accede to their proposal and it is further observed that in its present condition the Canal is only in a condition to accomplish the Lock named object— (see in the Chief Engineer's letter.)

6. In the present state of the works it seems idle to enter into any discussion with regard to the saving which might have been effected had navigation not been one of the objects in view. When they were undertaken the question of the reduction of the size of the Locks also was fully investigated and the decision of Government recorded in

the preceding quoted in the margin was based on a full report from the consulting Engineer which shewed that the whole saving which would be effected by the adoption of the proposition was only Rs 4,40,000— while the objections to it were weighty & Assuming that the works as they stand at present can irrigate as well crop or secure by periodical flooding dry crop on a total of 350,000 acres of land the Chief Engineer proceeds to make the following Calculation of Revenue as it will stand within 10 years from the present time.

		Revenue
200,000	acres wet crop	1200000
150000	dry	150000
350000	Total Revenue Rs	1350000

Interest 8½ per cent on the Expended Capital

Government are fully aware of the actual state of the Revenue Account of this Company and probably will hardly endorse the views of the chief Engineer as to prospective returns which are it seems to me liable to be cha-

19th September 1857
No 2902

racterized as speculative Sanguine for any one who has witnessed the slow development of irrigation under Completed works in other localities. But even if this Estimate is accepted, the additions which have to be made to the debit side of the Account for guaranteed interest on Capital paid or to be paid and for Establishment Establishment and repairs render it not a very favorable exposition of the results of a Scheme viewed formerly as of so much promise.

I have the honor to be
Sir
Your most Obedt Servt

Arthur Scott
Capt. R.E.
Under Secy to Govt.
for Chief Engineer for
Irrigation & Canal
Secy to Govt

Compd.

1/ Sept. 1867 pp 457-58
18th April 1871 – 241-42

P.W. 1871 Dept
No. 46
From, No. 3478.
Asst. Chief Engineer
for Irrigation and
Joint Secretary to Govt
To
The Secretary to Govt
P.W.D.
Dated 15
Rec'd 20 } July 1871
Enclosure 1
Forwards with
reference to G.O. No. 1089
18 April 71 a Communi-
cation from the Chief
Engineer & Secretary &
a General Report on
objects of the original
Irrigation projects
& the ultimate prospects
of Irrigation in the Deccan
No 2089. 15

order thereon
to be recorded
No. 2089.
Ordered to be recorded
Forbes Bengt
15 Aug 71

1/2378

Govt of {1871} Madras.

PUBLIC WORKS.

To

Dated

Read Encl.

G O 15 Augt 1871, N 2089.

Nos. 154 & 155

Tornbadra Project. Letter

from the Chief Engr for Irrign. transmitting correspondence together with a report on the Objects of the original Tornbadra Project & the ultimate prospects of Revenue, received