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MADRAS RECORD OFFICE.

Government of Madras.

Public Works DEPARTMENT.

G.O. No. <u>382</u>	Press Mis.
Dated <u>18</u> <u>5</u> 18 <u>8</u>	

Not to be folded or roughly handled

Read the following papers:—

No. 371. Proceedings of the Madras Government in the Revenue Department, dated 16th February 1877, No. 714.

ABSTRACT.—*Raghanatha Caveri Main Channel*.—Sanctioning the immediate commencement of the scheme for the restoration of the — from its upper end, as a relief work, at the cost of the Ramnad Estate; directing that the excavation, in the first instance, be only sufficient to admit of the maximum discharge estimated by Mr. Arbuthnott; and referring the papers to the Chief Engineer of Irrigation for report on the whole project.

No. 134—W.

No. 371-A. NOTE BY THE CHIEF ENGINEER FOR IRRIGATION.

Raghanatha Caveri improvements.

THE restoration of the Raghanatha Caveri to a state of efficiency is, judging from the papers recorded in Proceedings, Madras Government, Revenue Department, No. 714, of the 16th February 1877, and from those given in Proceedings, Madras Government, Revenue Department, of the 17th November 1876, No. 1,705, a work of great importance and one from which great benefit to the country in the Ramnad Zemindary commanded may be anticipated.

2. The examination of the project in such a way as would be requisite to determine the best way of applying the water-supply available to the area to be irrigated and of avoiding the errors which have led to the deterioration of this old irrigation work would occupy a considerable time, which under existing circumstances the undersigned cannot well divert from the many matters requiring early attention. The plans and levels, moreover, have not been furnished to him, and without these no opinion on the details of the scheme can be offered. It may be noticed, however, that the Raghanatha Caveri was probably fairly efficient at some former time; 2ndly, that much of its present inefficiency is due to long continued neglect, coupled with the absence of proper regulation at the heads of some of the upper channels, which has led to their carrying off much more water than was proper or needful for the cultivation under them; 3rdly, that the circumstances of the channels and the irrigation appear to have been very carefully inquired into, so that there is good reason for supposing that the contemplated improvements will secure, at least to a great extent, the advantages which are anticipated, and thus justify the very considerable outlay of Rupees 3,20,000 estimated to be necessary. It may be noticed that, as this estimate includes only 5 per cent. for establishment, the cost of the work including supervision will probably be some 50,000 or 60,000 Rupees more.

3. There are some few points which appear to need special attention.

Although perhaps a greater part of the inefficiency of the main channel is due to neglect and the absence of regulation of the off-takes, it is probable that original

defects of construction or arrangement must have had something to do with this result and it should, it is thought, be specially considered:—

(a.) Whether the fall of the channel, which is in parts very great with a consequently high velocity of water, is suited to the nature of the soil. If this velocity be in excess of what the soil will stand, erosions and silting and therefore either deterioration or expensive maintenance will be inevitable. While then high velocities may be proper and allowable where the soil is hard, they must by drops or regulating weirs be reduced wherever the soil is unable to withstand them.

(b.) The channel receives a good deal of upland drainage, and for the discharge of all in excess of the capacity of the channel surplus works will have to be provided, and should be designed with reference to—

(1.) The maximum flood discharge of the drainage.

(2.) The maximum level to which the water may be allowed to rise with reference to the height of banks, velocity in channel admissible, &c. Every surplus work for the disposal of upland drainage liable to bring silt into the channel should be provided with undersluice vents of considerable capacity,* the sills of which should be placed as low as the bed of the drainage below the channel will allow or, say, anything up to 3 or 4 feet below the bed of the channel in exceptional cases. These sluice vents should be fitted with shutters capable of being easily worked. It should be remembered that such sluices are for the purpose of preventing the deposit of silt, and that when the drainages are in fresh the water brought down by them should be discharged through the sluice vents until its quantity exceeds their capacity when it will flow over the weirs.

(3.) The main channel may either retain its full section throughout or be diminished in size gradually as the quantity of irrigation water, to be carried ordinarily, becomes less. The latter is in many respects the better arrangement, because only by adapting the section and fall of the channel to the supply to be conveyed can suitable water-levels and velocities be maintained, but with this arrangement proper means of disposing to surplus of the difference between the quantities carried in successive miles or sections are essential to efficiency.

4. The earthworks of the main and subsidiary channels are suitable for the employment of famine relief labor, but it is clear from the papers that to make this part of the work of any real and permanent value, the regulating works for the heads of branch channels, for disposing of land drainage, and for adapting the fall to the soil should be carried out simultaneously, or temporary arrangements should be made to the same end, otherwise much of the work will have to be done over again and money will be wasted.

5. The District Engineer, Madura, should furnish the Special Assistant Engineer in charge with a copy of those circulars of the Irrigation Department which refer to matters with which Mr. Arbuthnott will have to deal.

FORT ST. GEORGE,
6th March 1877.

(Signed) JOHN MULLINS, Lt.-Col., R.E.,
Chief Engineer for Irrigation.

No. 372.

ORDER THEREON, 15th March 1877, No. 882.

IRRIGATION, No. 30.

COMMUNICATED to the Revenue Department, with reference to the Order in that Department of the 16th February 1877, No. 714.

(True Extract.)

Lieut.-Colonel, R.E.,
Secretary to Government, P.W.D.

To the Revenue Department.
" District Engineer, Madura.
" Chief Engineer for Irrigation.

Exd. E. C. Shunker.
Spare Copies

20 2
No. 134 W. Office of the Chief Engineer for
Irrigation, Fort St. George
6th March 1877

Enclosures 1.

Note by the Chief Engineer for Irrigation

Ragunatha Cauvery improvements.

The restoration of the Ragunatha
Cauvery to a state of efficiency is jud-
ging from the papers recorded in
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avoiding the errors which have led to the deterioration of this old irrigation work would occupy a considerable time, which under existing circumstances the undersigned cannot well divert from the many matters requiring early attention. The plans and levels moreover have not been furnished to him, and without these no opinion on the details of the scheme can be offered. It may be noticed however that the Ragu-natha Cauvery was probably fairly efficient at some former time; 2nd that much of its present inefficiency is due to long continued neglect, coupled with the absence of proper regulation at the heads of some of the upper channels, which has led to their carrying off much more water than was proper or needful for the cultivation under them; 3rd that

5
4 The earth works of the main and subsidiary channels are suitable for the employment of Famine relief labour, but it is clear from the papers that to make this part of the work of any real and permanent value, the regulating works for the heads of branch channels, for disposing of land drainage, and for adapting the fall to the soil should be carried out simultaneously, or temporary arrangements should be made to the same end, otherwise much of the work will have to be done over again and money will be wasted.

5 The District Engineer Madurai should furnish the Special

Assistant

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to a copy of those circulars of the Irri-
gation Department which refer to
matters with which Mr. Arbutnott
will have to deal.

Wm. L. P. E.
Chief Engineer for Irrigation.

To
The Secretary to Government
P. W. D.

Mr. Arbutnott

Proceedings of the Madras Government, Revenue Department,
16th February 1877.

Read the following papers:—

No. 553. Proceedings of the Court of Wards, dated 10th February 1877.
Read again Proceedings of the Court of Wards, dated 25th October 1876, No. 2,657.

Read also the following papers:—

From J. LEE-WARNER, Esq., Special Assistant Collector, Ramnad, to
W. McQUHAE, Esq., Collector of Madura, dated Camoody, 13th
January 1877, No. 13.

With reference to the Acting Collector's endorsement, Miscellaneous No. 160,
to Proceedings of the Court of Wards, No. 2,657, dated 25th October 1876, I have
the honor to forward the Assistant Engineer's report. Mr. Arbutnott has no fault
to find with the plans and estimates if he can be sure that the discharge of the
river at flood has been properly calculated. He differs materially, however, with
the Overseers on this important point, basing his calculations upon observations of
the wetted section of the river after a flood and the natural fall of the bed, as he
was too late on the scene to observe any flood passing down last season. The Court
of Wards are well aware that this has been an unusually dry season, and that, if
we are to wait for the next floods to give Mr. Arbutnott opportunities for
collecting his own data, we are losing the invaluable opportunity of procuring
labor which the present distress offers. But Mr. Arbutnott sees no objection to
designing and digging out his own channel of an inferior capacity to the Overseers
subject to further enlargement as new calculations are taken from experience.
There will be no waste of money or labor in this scheme as the depth of the
channels must remain the same. Until the main channel is completely excavated
according to a revised estimate, which I propose putting under preparation at once,
I should not meddle with the subsidiary channels at all.

2. The Court of Wards have not over-estimated the importance of this great
work from the remunerative aspect, and I have now to deal only with the consider-
ation how and what funds are to be provided. According to our latest Overseer's
reports, we have nearly 5,000 able-bodied persons working on tank-repair in the
three distressed taluqs, so that by the end of March, or sooner, if these numbers
increase, we may expect to see all the estimates now sanctioned worked through,
and so much labor begging for employment through the hot months until July,
when the ordinary rains commence and ryots are wanted at home to prepare the
fields for cultivation; so it is a question of more funds for State relief works
through April, May, June, or more funds for execution of tank and other
profitable work within the estate. Every one is agreed on which class of work
the zemindari labor ought to find employment in case of such a distress as the
present; and therefore, convinced as I am of the soundness of this project and
anxious to avail myself of the large amount of able-bodied labor now organized,
I have no hesitation in putting forward the proposal that the Government advance
the sum necessary under the Lands Improvement Act. As the revised estimate
will not be commenced until the answer of the Court of Wards is received
upon this and Mr. Arbutnott's letter, I earnestly solicit that the Overseer's
estimate, Rs. 85,500, for the main channel alone may be accepted as the basis of

a liberal grant of funds on that account. Of course, if this important work is sanctioned, the Government must find some other agency for the superintendence of the Camoody and Viruduputty State relief road than Mr. Arbuthnott's. There is no question that, if this or any other project in which the estate interest is so deeply involved can be set afoot, Mr. Arbuthnott, who draws his salary from the estate, ought to be working there.

ENCLOSURE No. 1

From J. ARBUTHNOTT, Esq., Assistant Engineer, Ramnad, to J. LEE-WARNER, Esq., Special Assistant Collector, Ramnad, dated Camoody, 29th December 1876, No. A.

With reference to your No. 8, dated 4th instant, I have the honor to report that I have gone over and examined the plans and estimates of the Regunatha Cauvery project, and, with the exception of the water register, have found them to be correct. My reasons for rejecting the latter are—

1st.—That trustworthy observations of the rate at which the water was flowing in flood were not taken, the Overseer, having no watch, counted imaginary seconds.

2ndly.—The section of the flood-stream was taken at a place where the river, overflowing its banks, spread out over a wide area, consequently the whole section could not have been moving at anything like the rate of the main channel if it was moving at all.

2. With a view to seeing if it was possible to ascertain roughly the amount of water passing down the Regunatha Cauvery in an ordinary flood, I took sections both above and below the surplus calingulahs wherever I could get a tolerably straight reach and even section. I was able to do his tolerably accurately, as the flood-marks of October 3rd were fairly distinct. This flood on 3rd October 1876 was an ordinary one; in such a flood 2 feet escapes over the surplus calingulahs; in a most extraordinary fresh the river rises 4 feet on the crest of the calingulahs; but this does not happen once in ten years, so I do not think it should be taken into account. The following are the results of my investigations:—

Above the Calingulahs.

Sections taken above $\frac{1}{4}$ of a mile above—

Mean wetted section	...	...	...	...	square feet 766.5
Do. perimeter	...	...	...	...	lineal feet 103.0
Fall of bed per mile	...	...	...	...	feet 3.54
Discharge = 4,706 cubic feet per second, or 15,059,200 cubic yards per day.					

Below the Calingulahs.

Sections taken $\frac{1}{2}$ mile below—

Mean wetted section	...	...	...	...	cubic feet 729.5
Do. perimeter	...	...	...	...	lineal feet 191.0
Fall of bed per mile	...	...	...	...	feet 2.0
Discharge = 2,109 cubic feet per second, or 6,748,800 cubic yards per day.					

Discharge of Regunatha Cauvery.

Theoretic maximum discharge of the Regunatha Cauvery in ordinary floods—

Above the surplus calingulahs with two feet going over crests.					
Fall of bed per mile	...	...	...	...	feet 3.54
Mean wetted section	...	...	...	...	square feet 766.50
Do. perimeter	...	...	...	...	lineal feet 103.00
Discharge = area $\times$ mean velocity					
= $a \times M.V.$					
Mean velocity = $c \sqrt{H.I.}$					

When R is the hydraulic mean depth = $\frac{\text{Area of water section}}{\text{Wetted perimeter.}}$

When I is the inclination of the bed in unity = $\frac{\text{Fall in feet per mile}}{5,280}$

and c is a coefficient varying according to the nature of the bed and the value of R .

$$R = \frac{A}{W.P.} = \frac{766.5}{103} = 7.43$$

By Bayne's Tables $c = 87.0$

$$\log. 3.54 = 0.5490033$$

$$I = \frac{3.54}{5280} = 0.00067 \text{ colog. } 5,280 = 4.2773661$$

$$= 4.8263694 \text{ log. of } 0.00067$$

$$MV = c \sqrt{R.I.} = 87 \sqrt{7.43 \times 0.00067}$$

$$MV = 6.14 \text{ log. } 87 = 1.9395193$$

$$\frac{1}{2} \log. 7.43 = 0.4354944$$

$$\frac{1}{2} \log 0.00067 = 2.4131847$$

$$0.7881984 \text{ log. of } 6.14$$

$$D = a \times MV = 766.5 \times 6.14$$

$$D = 4706 \text{ cubic feet per second.}$$

Below the surplus calingulahs with two feet going over crest.

Fall of bed per mile	...	...	...	...	feet 2.00
Mean wetted section	...	...	...	...	square feet 729.50
Mean wetted perimeter	...	...	...	...	lineal feet 191.00 lineal.

$$D = a \times MV.$$

$$MV = c \sqrt{R.I.}$$

$$R = \frac{729.5}{191} = 3.82$$

By Bayne's Tables $c = 76$

$$I = \frac{2}{5280} \text{ log. } 2 = 0.3010300$$

$$\text{colog. } 5280 = 4.2773661$$

$$I = 0.00038 \quad 4.5783961 \text{ log. of } 0.00038$$

$$MV = c \sqrt{R.I.} = 76 \sqrt{3.82 \times 0.00038}$$

$$\log. 76 = 1.8808136$$

$$\frac{1}{2} \log. 3.82 = 0.2910317$$

$$\frac{1}{2} \log. 0.00038 = 2.2891981$$

$$0.4610434 \text{ log. of } 2.891$$

$$MV = 2.891$$

$$D = a \times MV = 729.50 \times 2.891$$

$$D = 2,109 \text{ cubic feet per second.}$$

Discharge through the calingulahs is the difference of these, and amounts to 2,597 cubic feet per second, or rather more than the discharge of the river below the calingulahs.

In the foregoing the mean velocity is calculated from the fall per mile, and is therefore theoretic. The actual mean velocity would most probably be less, certainly not more.

I would, therefore, recommend that the main and subsidiary channels should not be commenced till after the next monsoon, during which I hope to have many opportunities for gauging the discharge of the river. There is no reason why all the tanks estimated for should not be begun at once, as there is plenty of water in the river to fill them; but these are not sufficient data to go on at present in designing the channels. It will be seen from the calculations that not more than 4,706 cubic feet per second can be taken as the maximum discharge of ordinary floods,

and that can only be sent down the channel by closing both calingulabs. If, then, it is found necessary to begin the work so as to employ the people, the channel can be designed to carry that quantity; if it may be necessary hereafter to increase the capacity of the channel, it can easily be done; but if made too large at first money will be uselessly expended. Longitudinal sections are now being taken of the subsidiary channels; these for the most part have never been properly lined out. The water has been allowed to flow wherever it could find a way; the channels are very tortuous. The velocity of the water is hereby much checked, and rapid erosion of the banks and the consequent silting up occurs. It may, therefore, be found necessary, if the cost be not too great, to line out entirely new channels; but for the present old channels cleared out and straightened will do.

The masonry works, with the exception of the two calingulabs at Camoody (which are very substantially built and faced with cut-stones) are in ruins. New works have, therefore, been provided for in the estimates. The plans may have to be altered in detail, but the money will be sufficient.

No. 9.

SUBMITTED to the Court of Wards with reference to their Proceedings, dated 25th October 1876, No. 2,657. I approve of Mr. Lee-Warner's proposals, and recommend that the digging of the channel, as suggested by him, may be ordered to be commenced at once. I think that a separate estimate of the work that can be done as a famine relief work should be prepared; that the estate should pay the value of work actually done according to this estimate; and that the extra cost, if any, caused by the employment of women, children, and half-starved men should be debited to Famine Relief. I can scarcely select any roads for construction in this part of the country, where distress will increase daily till next cultivating season. The soil is chiefly black cotton, over which we have hitherto failed in our attempts to make roads at the rate of even a mile a year and at a cost of nearly Rs. 6,000 a-mile as may be seen between Permagudy and Ramnad. If this channel belonged to Government, we would concentrate in it all our famine relief expenditure for the district through which it runs, and any arrangement with the estate must be better than throwing away money on roads, which, owing to the difficulties of soil, will not be completed or maintained hereafter out of Local Funds.

2. It is very important that the Department of Public Works Subordinates should be strengthened in order that I may not have to ask Mr. Arbuthnot for any assistance, but the weakness of the department is great. The estimate for the Camoody and Viruduputty Road is needed emergently, and I cannot get it though the book survey was finished two months ago.

MADURA,
23rd January 1877.

(Signed) W. McQUHAE,
Collector.

No. 354. From W. McQUHAE, Esq., Collector of Madura, to H. E. STOKES, Esq., Acting Secretary to the Board of Revenue, dated Madura, 6th February 1877, No. 71.

I HAVE the honor to request the Board's instructions regarding the road from Camoody to Viruduputty sanctioned as a famine relief work in Proceedings, Miscellaneous No. 37, dated 3rd ultimo.

that the circumstances of the channel and the irrigation appear to have been very carefully enquired into, so that there is good reason for supposing that the contemplated improvements will secure, at least to a great extent, the advantages which are anticipated, and thus justify the very considerable outlay of Rupees 32,000 estimated to be necessary. It may be noticed that as this estimate includes only 5 per cent for establishment the cost of the work including supervision will probably be some 50 or 60 thousand Rupees more.

3. There are some few points which appear to need special attention. Although perhaps a greater part of the inefficiency of the main channel is due to neglect and the absence of regulation of the off-takes it

it is probable that original defects of construction or arrangement must have had something to do with this result, and it should, it is thought, be specially considered.

A. Whether the fall of the channel, which is in parts very great, with a consequently high velocity of water, is suited to the nature of the soil. If this velocity be in excess of what the soil will stand, erosions and silting and therefore either deterioration or expensive maintenance will be inevitable. While then high velocities may be proper and allowable where the soil is hard, they must by drops or regulating weirs be reduced wherever the soil is unable to withstand them.

B. The channel receives a good deal of upland drainage and for the discharge of all in excess of the capacity

capacity of the channel surplus works will have to be provided, and should be designed with reference to:

- (a) the maximum flood discharge of the drainage.
- (b) the maximum level to which the water may be allowed to rise with reference to the height of banks, velocity in channel admissible, &c.

Every surplus work for the disposal of upland drainage liable to bring silt into the channel ^{should} be provided with undersluice vents of considerable capacity, the sills of which should be placed as low as the bed of the drainage below the channel will allow or, say, any thing up to 3 or 4 feet below the bed of the channel in exceptional cases. These sluice vents should be fitted with shutters capable of being easily worked. It should be remembered that such sluices are for

*
may equal to $\frac{1}{4}$ to $\frac{1}{6}$
of total discharge

for the purpose of preventing the deposit of silt, that when the drainages are in fresh, the water brought down by them should be discharged through the sluice vents until its quantity exceeds their capacity when it will flow over the weirs.

C. The main channel may either retain its full section throughout or be diminished in size gradually as the quantity of irrigation water to be carried ordinarily becomes less. The latter is in many respects the better arrangement because only by adapting the section and fall of the channel to the supply to be conveyed can suitable water levels and velocities be maintained, but with this arrangement proper means of disposing of surplus of the difference between the quantities carried in successive miles or sections are essential to efficiency.

P.W.D.

8777

NR 2178

From

The Chief Engineer for Irrigation,

To

The Secretary to Government,

Public Works Department.

Dated 6th March 1877.
Despatched
Received

ENCLOSURE 1.

No. B4-W

Subject.

Ragunatha Cauvery Improvements.
- Madras District. - Note stating that
the restoration of the Ragunatha Cauvery
will be a work from which great
benefit to the country in the Ramnad
Zemindari will result and requiring
on certain points in connection with the
- requiring special attention.

371 A

Proceedings of the Madras Government, Revenue Department,
16th February 1877.

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2. It is now found that the compensation for the land along the whole line of 30 miles will not be less than Rupees 20,000, and consequently Mr. Turner has not commenced work. The question is whether this compensation can be paid in the first instance at least out of famine relief funds, and, if not, what is to be done for famine relief work in Ramnad. The people are leaving the country in streams both to the northward and to Ceylon, but this cannot go on much longer, and we must provide work without delay for a large number who cannot find employment by migrating elsewhere. I recommended the Ragunatha Cauvery scheme, and, if that be sanctioned, we may abandon this road from Camoody to Viruduputty for the present; but, if not, I can suggest no substitute but this road.

3. The number that left the ports in the district for Ceylon in 1875 and 1876 with the number that returned are as follow:—

	Number that left the Ports for Ceylon.	Number that returned from Ceylon.
1875	62,629	56,718½
1876	107,253	30,772

The numbers that passed northwards into Tanjore can only be estimated, but are very great. This depopulation of the country has made it an easy matter hitherto to meet the famine, but it cannot last. There must be a limit to the number that can find employment in Ceylon and Tanjore.

From J. LEE-WARNER, Esq., Special Assistant Collector, Ramnad, to
W. McQUHAE, Esq., Collector of Madura, dated 2nd February 1877,
No. 32.

I HAVE the honor to inform you that I have this day written to Mr. Arbuthnott to proceed to the lower end of the Regunatha Cauvery Channel and commence laying out work on the modified section proposed in my letter, No. 13, dated 13th January 1877. For extra establishment I have assigned to him the two maistries sent down by the Public Works Department for employment on State relief work and two of Mr. Gompertz' measurers. I want Mr. Arbuthnott to have three miles of levellings on three lines ready by the 15th, so that I can place one thousand persons at each end. The Central Range Overseer reports that most of his large tank repairs will be completed about the 25th, and the laborers will then be searching for employment elsewhere. I have suggested to Mr. Arbuthnott that they can then be brought on to the channel work in gangs, and the work can proceed in charge of the Overseer. The whole revised estimate cannot be ready with plans and sections before the end of March. I hope, therefore, that, if you have any objection to my employing labor in this way before the sanction of the Court of Wards is received, you will at once let me know.

No. 15.

SUBMITTED to the Court of Wards with reference to my endorsement, dated 23rd January 1877, No. 9, on Mr. Lee-Warner's letter, No. 13, of the 13th idem and with the request that sanction to commence the Ragunatha Cauvery may be granted as soon as possible and communicated by telegram. The commencement of the road from Camoody to Viruduputty having been postponed, there is now no famine relief work open in Ramnad except the road between Camoody and Sayelgudy, which will soon be finished.

MADURA,
7th February 1877.

(Signed) W. McQUHAE,
Collector.

SUBMITTED for the early orders of Government in continuation of the Court's Proceedings, dated 10th instant.

2. In the first of the foregoing letters the Collector of Madura suggests that the Ragunatha Cauvery scheme be undertaken as a relief work in the Ramnad Estate in lieu of the road from Camoody towards Viruduputty, for which Rs. 15,000 was recently sanctioned by telegram, it having now been ascertained that the compensation for the land required for the whole line of road will amount to no less a sum than Rs. 20,000.

In the second letter Mr. McQuhae requests that the Court's sanction for the commencement of the execution of the Ragunatha Cauvery project may be granted as soon as possible and communicated by telegram. It appears that the tank repairs, which have hitherto afforded employment to laborers in the Ramnad Estate, will be completed on the 25th instant, and that work must be found without delay.

3. The Court of Wards have already strongly supported the proposal that the scheme alluded to should be undertaken as a relief work, the excess over the value of the work done being borne by the State, and they request the early orders of Government on the recommendation. The Collector should furnish the estimate of the work suited for execution as a relief work with the least possible delay. It is clear that the road must be abandoned, payment of so large a sum from relief funds in compensation for land taken up being out of the question.

(True Copies and Extract.)

(Signed) C. A. GALTON,
Acting Sub-Secretary.

With the foregoing letter the Collector submits further information regarding the Regunatha Cauvery Project after investigation by Mr. Arbuthnott, the Assistant Engineer in charge of the estate; the latter has found the plans and estimates correct, with the exception of the water register, which he considers not to be based on sufficiently trustworthy data. The maximum discharge of ordinary floods is now estimated at not more than 4,706 cubic feet per second, instead of nearly 15,000. It is stated, however, that there is no reason why all the tanks estimated for should not be begun at once, as there is plenty of water to fill them, and the main channel could also be constructed of an inferior capacity to that originally planned, subject to enlargement, when the dimensions required have been more accurately ascertained. It is not proposed to touch the subsidiary channels at present.

2. Mr. Lee-Warner urges most strongly the advisability of commencing the main channel at once, for which the Overseer's estimate is Rupees 85,500, pending the preparation of a revised estimate for the whole scheme. Work must shortly be found for a large body of laborers at present employed on tank repairs, and if the estate does not provide it, State relief-works will be a necessity. Mr. McQuhae points out that the construction of roads in this part of the country is out of the question, and considers the excavation of the Regunatha Cauvery Channel admirably suited for a relief-work. He suggests that a separate estimate of the work that

is suited for execution as a relief-work should be prepared, the estate being called upon to pay only the value of the work done, the extra cost arising from the employment of inferior labor being debited to the State. This proposition meets with the Court's cordial approval, and they most strongly recommend it to the favorable consideration of Government. They fear that unless this plan be adopted the work cannot be undertaken at present, as the estate has not the ready money at its disposal, nor could a loan be obtained under the Land Improvement Act under recent orders, even if the information regarding the project were sufficient to admit of an application being made in conformity with the rules, which at present is not the case. The work will eventually prove remunerative to the estate, whilst the State will be reimbursed as regards a considerable portion of the expenditure incurred in relieving the distressed population of this part of the country. It appears that the tank repairs will provide occupation till the middle or end of March; meanwhile the revised estimate could be prepared by Mr. Arbuthnott and the work marked out.

3. As regards sanction for the execution of the whole project, the Court must await the revised estimate, but in the meantime it appears advisable that so costly and important an undertaking should not be commenced until the highest professional opinion as to its feasibility and the correctness of the calculations on which the estimates are based has been obtained; the Court request, therefore, that all the papers may be referred to the Chief Engineer for Irrigation for an expression of his opinion. The details of the projects are set forth in the papers embodied in G.O., dated 17th November 1876, No. 1,705.

(True Extract.)

(Signed) C. A. GALTON,
Acting Sub-Secretary.

No. 555. ORDER THEREON, 16th February 1877, No. 714.

Irrigation.

THE Government sanction the immediate commencement of the scheme for the restoration of the Raghanatha Caveri

Main Channel from its upper end, as a relief-work, at the cost of the Ramnad Estate.

2. The excavation will, in the first instance, be only sufficient to admit of the maximum discharge estimated by Mr. Assistant Engineer Arbuthnott in his letter of the 29th December 1876, No. A.

3. The papers will be referred to the Chief Engineer for Irrigation for report on the whole project.

(True Extract.)

J. H. Smith
Additional Secretary to Government.

To the Court of Wards.
.. the Public Works Department.
.. the Chief Engineer for Irrigation.
.. the Financial Department.
Exd. J. W. Fisher

his 1.12.76. No 14.
23.11.76. 156.

W.D.
G. 377.
No. 2418

No 882

Public Works Department.

PROCEEDINGS of the MADRAS GOVERNMENT.

UNDER date the 15 March 1877

Proceedings, Rev. Dept (H.E. No 714 of 16 Feb 1877)
Note by the Chief Engineer for Irrigation (H.E. No 134 W. of 6 March 1877)

Communicated to the
Rev. Dept. with reference
to the order in that De-
partment of the 16 Feb
1877. - H 714

by 7/3

Recd
4/3

To the Rev. Dept.
" - Dist. Eng. Madras
" - Chief Eng. for Irrigation. Dated 13-3-77

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Encl

Q. O., 1st A. 1877, No. 882

Nos. 371-372

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Madura Or - Note by the
Chief Engineer for Engineer and
the restoration of the —,
Commd to the Rev Dept.

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