

(1) Number of pages _____

(2) Date of repair _____

(3) Initials of the Referencer _____

MADRAS RECORD OFFICE.

Government of Madras.

Public works DEPARTMENT.

G.O. No. 1505	Press Mis.→
33-34	
Dated 2. 6	1871.

Not to be folded or roughly handled

*Proceedings of the Madras Government. Public Works Department,
2nd. June 1871.*

No. 33. Read the following Endorsement of the Chief Engineer for Irrigation, dated Madras, 9th May 1871, No. 20:—

From the Agent and Manager of the Madras Irrigation and Canal Company, to the Chief Engineer for Irrigation, dated Madras, 3rd May 1871, No. 200.

With reference to the order passed by Government on the 18th April 1871, No. 1,089; I have the honour to submit, for consideration, a letter which I have received from the Chief Engineer, dated 26th April 1871.

From the Chief Engineer, to the Agent and Manager of the Madras Irrigation and Canal Company, dated Coonoor, 26th April 1871.

Your No. 348 of 21st instant and G. O. No. 1,089 of 18th instant.

1. Some apparent inconsistencies on both sides of the argument, as to what repairs should be charged to *Revenue* and what to *Capital*, seem due to losing sight of the fact that the canal is so constructed as to require a staff of men to work it safely, and that the Government set aside the recommendation of the Company's officers as to the number of sluice-keepers and bankers necessary to work the canal, and ordered the number to be reduced to half and one-third respectively. The breaches occurred and have proved the staff too small, and Government have now trebled the number of bankers. Whether, had the staff been sufficient, the danger from so entirely unexpected a flood *would* have been averted, is a matter of conjecture, probably it would not; that it *could* have been averted is certain, so far as the damages exceed ordinary repairs. The tail bund at Ulloor, perhaps the No. 13 calingulah, and some low parts of the canal bank only need have been injured, so far as can be seen.

2. Incidentally, another matter requires mention. My opinion, in opposition to that of Government, is in favour of *self-acting* protective works. I have no objection to repeat "that the canal will never be safe (to my satisfaction) unless the calingulahs are sufficient to pass off all rain-water safely," using "calingulahs" as the *querie* term for the self-acting waste apparatus as used in native tanks. Native calingulahs are always, I think I may say, masked. After the heaviest rain subsides a bank of brush and earth is run across them. They are often natural gravel or rock; and where that has not been available, or has gradually cut up, masonry works, with facilities on their crests for making the annual bank across them, have been erected. This opinion of mine is merely equivalent to saying that *I see risk* in trusting to sluice-keepers and bankers for working sluices or clearing away banks at critical times of danger. That question has been settled by Government, and sluices are to be reckoned as trustworthy for securing safety.

3. Again, the precautions described in paragraph 11 of the Consulting Engineer's letter are not incidental to an incomplete canal, but to an incomplete conservancy staff. These precautions enable the Company to dispense with a staff of two or three sluice-keepers at each sluice or bank requiring to be opened or removed at critical times of danger, without running risk of a failure of supply of water sufficient to meet all probable demand in the ensuing season. The sluices are *complete*.

4. Of the three questions—

I.—What is the smallest staff suitable for working the canal for the present to the extent of the probable demand for water?

II.—What will be the cost of making all the works which are required to secure the canal from damage by floods *self-acting*?

III.—What is necessary to constitute the canal complete and efficient?
the first is for the present settled: the second is re-opened, but forms no part of the third; the third is under discussion, and I will make some remarks upon it.

5. So far as I know, the *principles* adopted for the protection of the present canal from damage by flood-waters pouring into it are as follow:—

(a.)—That calingulahs and emptying sluices combined be sufficient for ordinary floods.

(b)—That where low bank will require to be breached or removed during extraordinary floods, and the bank stands on soft ground, a masonry work be constructed so as to protect the original surface of the ground when the bank is removed and the water passes over it.

(c.)—That in case of excessive floods the banks which stand upon hard gravel or rock where the canal is in moderate cutting should be removed sufficiently to prevent danger to the loftier portions of bank.

Of these methods the calingulahs alone are self-acting.

In detail, calingulahs and sluices were considered sufficient if they could discharge quarter of an inch rainfall an hour by their combined action; but they generally can do more than this, especially where sluices have been inserted in calingulahs as an after-thought. The only masked calingulah actually completed and now existing is in the first section.

6. I do not understand paragraph 2 of the G. O. under review to alter the *principles* upon which safety is to be obtained, nor do I see how these could fairly be altered during the last nine months of the contract term. I accept them as theoretically sound, and do not understand the Government to desire the calingulahs to be made so large as above safely to discharge the greatest rainfall ever registered in the plains of South India.

The change, then, is in the detail. Hitherto the Government have (at the Yaloor lock and waste works, for instance,) condemned my designs as admitting of prudent reduction, because I neglected to reckon, in my calculation of the sufficiency of works of safety, the discharging power of sluices requiring manual labour to open them. To that view I suppose Government still hold. But they assume that ordinary floods prove larger than was foreseen, and desire the discharging power of calingulahs and sluices combined to be increased. It is not impossible that Government also consider that further outlay in increasing the discharging power of calingulahs and sluices will prove in the end economical. But it is pretty evident they do not desire to take my view of complete safety, namely, that should a storm occur of even two inches an hour, the canal should be safe without a man getting up from his bed, and without the working of any apparatus; for, in paragraph 4, they propose an arrangement of screws requiring the presence of men to work them.

The extent of the change desired by Government is not stated; for in paragraph 3 the Government do not decide on the number of inches rain for which each class of works should provide.

7. The following will, I expect, be the state of the canal on the 1st July 1871:—

I.—It will be capable of conveying a full irrigation supply for the Karnool, Cuddapah, and Nellore works.

II.—When so in full use, it will be capable of resisting the effect of a rise of water to 1 foot in excess of its full water level, even in a storm of wind.

This is the depth required by present surplus arrangements. Any further rise must be prevented by the *staff*: first, by opening sluices, and, secondly, by breaching the shallow banks over the masked calingulah, or on the sides of cuttings of gravel and rock.

8. Meantime, it is impossible to deny or to remove the risk that a *sudden* considerable rise of water in the canal must create, owing to the presence of vermin holes and of cracks due to drought. Their presence can be proved by a less expensive process than suddenly filling the canal.

9. The staff of bankers now sanctioned is sufficiently large to enable me to post watchers at all such bank as may need to be removed, and I am having measures taken for erecting shelter for them there and for removing surplus spoil, so as to leave the bank of the minimum section sanctioned by Government. Every effort will be made to instruct the men and to give them every facility for discharging their duty.

SUBMITTED to Government.

2. In paragraph 5 the Chief Engineer states what he understands to be the principles adopted in determining the kind and extent of works for relieving the

canal of flood-water, and in the following paragraph he assumes that they are approved of by Government and will therefore form one of the basis on which the completeness or incompleteness of the Company's works will have to be judged.

3. The principle marked (b) appears to me to be unsound, whether considered from the financial or engineering point of view, and I am not aware that it has been approved of by Government. If it be necessary to allow flood-water to escape from the canal at a point where the ground is soft it would be better to construct a regular escape with shutters, and this regular escape would be a less massive and expensive work than would be required to resist the action of flood-water suddenly released through a breached bank.

4. The Chief Engineer takes credit for the plan he proposes that it is self-acting, *i.e.*, that in case of extraordinary floods it would ensure safety to the canal without a man getting up from his bed, and without the working of any apparatus; but on examination it appears that it is intended that the canal shall be allowed to breach at several points, and it appears to me that the means to be provided for limiting the depth and scour of the effluent water at these points will have to be critically examined before they are approved of.

(Signed) J. G. RYVES, Captain, R.E.,
Chief Engineer for Irrigation.

No. 34. ORDER THEREON, 2nd June 1871, No. 1,505.

IRRIGATION, No. 1.

It is not very clear what object the Chief Engineer of the Madras Irrigation and Canal Company has in the reference he has made regarding G. O., No. 1,089, of 18th April 1871. In paragraphs 2 and 3 thereof, the Government plainly recorded their opinion as to the necessity for further provision being made for the discharge of flood-waters entering the Company's Main Canal, and that whatever the cost of such additional or improved works might be, the same would be fairly debitable to Capital; and the Government further fully discussed the general principles upon which the discharging capacity of such works should be regulated, the detailed arrangements being left to the Consulting Engineer, that is the Chief Engineer for Irrigation, to settle with the Company's officers. In the 4th paragraph of the order the Government condemned, as unsuitable for a work that is intended to be complete in itself, the arrangement which the Company's Chief Engineer proposed for intentionally allowing the canal to breach at defined points in the event of unusually heavy rain. The orders above quoted, taken in connection with the 12th paragraph of the Consulting Engineer's letter, obviously indicate that a surface discharge of one inch of rain fall an hour, which is reported to be the maximum fall on record, should form the primary basis of calculation, and that calculating from the area to be drained, and the capacity of the canal for absorbing flood-waters with due regard to the safe limit of depth above bed, the whole quantity of flood-waters for which escape by weirs would have to be provided could be determined, and from which the dimensions of those works (allowing for the discharge by sluices in connection with them) would have to be regulated, and the particular style of

*Proceedings of the Madras Government, Public Works Department,
2nd June 1871.*

calingulah that would probably be found most suitable was at the same time clearly indicated in the 4th paragraph of the order.

(True Extract.)

Colonel, R.E.,
Secretary to Government.

To the Acting Chief Engineer for Irrigation.
,, Agent and Manager of the Madras Irrigation and Canal Company.

Exd. S. T. Augustin.

No *Enclosure*
N^o 200.

*Madras Irr. and C.C.
Madras 3 May 1871*

From

*The Agent and Manager
of I. C. C.*

To

*The Chief Engineer
for Irrigation*

*With reference to the Order passed
by Government on the 18 April 1871
N^o 1089 I have the honor to submit for
consideration a letter which I have re-
ceived from the Chief Engineer dated
26 April 1871.*

*I have the honor to be,
Sir,*

Your most obed^t. servant

*Dr. Martin Charles Lee
Agent and Manager*

1 Enclosure.

Coonoor 26th April 1871.

To,

Mr. H. Henslowe Esq.
Agent and Manager,
Madras.

Sir,

Of our 348 of 21st Inst. & G.O. 1089 of 18th Inst.

Some apparent inconsistencies on both
Sides of the argument - as to what repairs should
be charged to revenue and what to Capital - seem
due to losing sight of the fact that the Canal is
so constructed, as to require a staff of men to
work it safely, and that the Government set on
aside the recommendation of the Company's Officers
as to the number of sluicekeepers and bankers
necessary to work the Canal, and ordered the num-
ber to be reduced to half and one third respectively.
The breaches occurred, and have proved the staff
too small; and Government have now trebled the
number of bankers. Whether had the staff been
sufficient, the danger from so entirely unexpected
a flood would have been averted, is a matter of
conjecture - probably it would not, that it could
have been averted is certain, so far as the da-
mages exceed ordinary repairs. The tail bund
at Ulloor perhaps the No 13 Balingula, and

Some

From
The Great and Powerful
Mr. H. H. Esq.
to the Chief Engineer
for inspection
No. 200
dated 3rd May 1871
Recd 3rd May 1871
P. H. 2164/71
Mr. Henslowe Esq. G.O. No. 1089
of 18th April submitted for
consideration a letter recd
from the Chief Engineer of 18th April 1871

some low parts of the Canal bank only need have been injured, so far as can be seen.

Incidentally, another matter requires mention. My opinion, in opposition to that of Government, is in favor of selfacting protective works. I have no objection to repeat "that the Canal will never be safe (to my satisfaction) unless the Calingulabs are sufficient to pass off all rain-water safely" - using "Calingulabs" as the generic term for the selfacting waste apparatus as used in Native tanks. Native Calingulabs are always, I think I may say, masked. After the heaviest rain subsides, a bank of brush and earth is run across them. They are often natural gravel or rock, and where that has not been available, or has gradually cut up, masonry works, with facilities on them crests for making the annual bank across them, have been erected. This opinion of mine is merely equivalent to saying that I see risk in trusting to sluice keepers and bankers for working sluices, or clearing away banks, at critical times of danger. That question has been settled by Government, and sluices are to be reckoned as trustworthy for securing safety.

3. - Again the precautions described in Part II of the Consulting Engineer's letter are not incidental to an incomplete Canal, but to an incomplete Conservancy staff. These precautions enable the Company to dispense with a staff

of 2 or 3 Sluicekeepers at each Sluice, or bank, requiring to be opened or removed, at critical times of danger; without running risk of a failure of supply of water sufficient to meet all probable demand in the ensuing season. The sluices are complete.

Of the three questions -

I. What is the smallest staff suitable for working the Canal for the present to the extent of the probable demand for water?

II. What will be the cost of making all the works which are required to secure the Canal from damage by floods selfacting?

III. What is necessary to constitute the Canal complete and efficient?

The first is, for the present settled; the second is reopened, but forms no part of the third; the third is under discussion, and I will make

some remarks upon it.

So far as I know, the principles adopted for the protection of the present Canal from damage by flood waters pouring into it are as follows:-

(a). That Calingulabs and emptying sluices combined be sufficient for Ordinary floods.

(b). That where low bank will require to be breached, or removed, during extraordinary floods, and the bank stands on soft ground, a masonry work be constructed, so as to protect the original surface of the ground, when the bank is removed and the water passes over it.

(c).

(C). That in cases of excessive floods the banks which stand upon hard gravel or rock where the Canal is in moderate cutting should be removed, sufficiently to prevent danger to the loftier portions of bank.

Of these methods the Culingulabs alone are self-acting. I in detail Culingulabs and sluices were considered sufficient if they could discharge $\frac{1}{4}$ inch rainfall an hour by their combined action: but they generally can do more than this, especially where sluices have been inserted in Culingulabs, as an after-thought. The only unmasked Culingulah actually completed and now existing, is in the first section.

I do not understand para 2 of the G.O. under review to alter the principles upon which safety is to be obtained: nor do I see how these could fairly be altered during the last 9 months of the contract term. I accept them as theoretically sound: and do not understand the Government to desire the Culingulabs to be made so large as alone safely to discharge the greatest rainfall ever registered in the plains of South India.

The change, then, is in the detail. Without the Government have (at the Yaloor lock and waste works, for instance) condemned my designs as admitting of present reduction; because I neglected to reckon in my calculation of the sufficiency of works of safety, the discharging power of sluices requiring manual labour to open

open them. To that view I suppose Government still hold. But they assume that ordinary floods prove larger than was foreseen, and desire the discharging power, of Culingulabs and sluices combined, to be increased. It is not impossible that Government also considers that further outlay, in increasing the discharging power of Culingulabs and sluices will prove, in the end, economical. But it is pretty evident they do not desire to take any view of complete safety. Viz: that should a storm occur of even 2 inches an hour, the Canal should be safe without a man getting up from his bed, and without the working of any apparatus, for in para 4 they propose an arrangement of screws, requiring the presence of men to work it. The extent of the change desired by Government is not stated; for in para 3 the Government do not decide on the number of inches rain for which each class of works should provide.

The following will, I expect, be the state of the Canal on the 1st July 1871.

- I. It will be capable of conveying a full irrigation supply for the Kurnool, Cuddapah and Vellore works.
- II. When so in full use, it will be capable of resisting the effect of a rise of water to 1 foot in excess of its full water level; even in a storm of wind.

This is the depth required by present sur-plus arrangements. Any further rise must be prevented

presented by the staff; first by opening sluices, and secondly by breaching the shallow banks over the masked Culingulab, or on the sides of cuttings of gravel and rock.

Meantime it is impossible to deny or to remove the risk that a sudden considerable rise of water in the Canal must create, owing to the presence of vermin holes and of cracks or due to drought. Their presence can be proved by a less expensive process than suddenly filling the Canal.

The Staff of bankers now sanctioned is sufficiently large to enable me to post water where at all such bank as may need to be removed; and I am having measures taken for erecting shelter for them there, and for removing surplus spoil, so as to leave the bank of the minimum section sanctioned by Government. Every effort will be made to instruct the river, and to give them every facility for discharging their duty.

I have the honor to be
Sir,

Your Most Obedient Servant.
/Signed/ John H. Latham
Chief Engineer.

13✓ 5
Letter from the Agent and Manager Madras
Irrigation and Canal Company No 200 3rd May
with another from the Chief Engineer dated 26th
April 1871 attached.

No 20.
1. Submitted to Government.
2. In para: 5 the Chief Engineer states what he understands to be the principles adopted in determining the kind and extent of works for relieving the Canal of flood water and in the following para: he assumes that they are approved of by Government and will therefore form one of the bases on which the complete-ness or incompleteness of the Company's works will have to be judged.

3. The principle marked (b) appears to me to be unsound whether considered from the financial or engineering point of view, and I am not aware that it has been approved of by Government. If it be necessary to allow flood water to escape from the Canal at a point where the ground is soft it would be better to construct a regular escape with shutters and this regular escape would be a less massive and expensive work than would be required to resist

Ms. 2164/71

resist the action of flood water suddenly released
through a breached bank. -
The Chief Engineer takes credit for the
plan he proposed that it is self acting i.e. that
in case of extraordinary floods it would ensure
safety to the Canal without a man getting
up from his bed and without the working of
any apparatus, but on examination it appears
that it is intended that the Canal shall be al-
lowed to breach at several points and it ap-
pears to me that the means to be provided for
limiting the depth and scour of the affluent
water at these points will have to be critically
examined before they are approved of.

Office of Chief Engineer for irrigation, W. R. - Capt. B.
Madras, 9th May 1871. - 3
Chief Engineer for Irrigation.

The Secretary to Government
Public Works Department.

C. M. B.

N.

reference he has made re-
garding L. O. No. 1089 of 18th
April 1871. In paragraphs
2 and 3 thereof, the Govern-
ment plainly recorded their
opinion as to the necessity
for further provision being
made for the discharge of
flood waters entering the
Company's main Canal,
and that whatever the cost

1505 P.M.S.
 Proceedings of the Madras Government.
 From: The Chief Engineer for Irrigation } (H. E. No. 2089 - May/71)
 Read the following

It is not very clear what object the Chief Engineer of the Madras Irrigation and Canal Company has in the reference he has made regarding G.O. No. 1089 of 18th April 1871. In paragraphs 2 and 3 thereof, the Government plainly recorded their opinion as to the necessity for further provision being made for the discharge of flood waters entering the Company's main Canal, and that whatever the cost

N.

Recd 18 April 11 2024/1 242

18 April 11 2024/1
 The Chief Engineer for Irrigation
 to the Secretary & Govt. Secy.

12th May/71
 Sec: 2.1

Submitted to the Government
 by the Chief Engineer for Irrigation
 in reference to G.O. No. 1089 of 18th April 1871.
 The Government have been advised by the Chief Engineer for Irrigation that the plan for the discharge of flood waters entering the main Canal is not satisfactory and that the cost of the proposed works is too high.

Office of Chief Engineer for Irrigation
 Madras, 9th May 1871.
 Chief Engineer for Irrigation.

The Secretary to Government
 Public Works Department.

E. M. B.

18 May 11 A. 22

18 May 11 A. 22

1505 - 22 May/71

which escape by weirs would
have to be provided could
be determined, and from which
the dimensions of those works
(allowing for the discharge by
sluices in connection with them)
would have to be regulated,
and the particular style
of Calingula that would pro-
bably be found most suit-
able was at the same time
clearly indicated in the
4th para of the order.

14 May.

To the M^r. Ch. Engineer for the
Agent & Engineer ~~for the~~

Des^{pts} 3/6/71

618 May 71 @ 22 am

Govt of (1871) Madras.

PUBLIC WORKS.

To ^W The Chief Engineer Irrigation

Dated

Recd.

Encl. 2

G. O. 2 June 1871. No 1505.

No. 33434

M. S. in Madras.

Reference is made to the order of the Government of Madras, dated 1st July 1870, in relation to the cost of certain improvements in the works of the Irrigation Department, and to the order of the Government of Madras, dated 1st July 1870, in relation to the cost of certain improvements in the works of the Irrigation Department, and to the order of the Government of Madras, dated 1st July 1870, in relation to the cost of certain improvements in the works of the Irrigation Department.