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MADRAS RECORD OFFICE.

Government of Madras.

Public Works DEPARTMENT.

G.O. No. 853	Press Mrs.
736-37	
Dated 22-3-	18 7/.

Not to be folded or roughly handled

*Proceedings of the Madras Government, Public Works Department,
22nd March 1871.*

No. 536. Read the following letter from the Consulting Engineer for Irrigation and Canal Company, to the Secretary to Government, Public Works Department, dated Madras, 3rd March 1871, No. 129 :—

I HAVE the honour to submit drawings and an estimate, amounting to Rupees 6,130, for the restoration, in a modified form, of Calingulah No. 13 in the 25th mile of the Main Canal which breached in August last, and which are accompanied by the correspondence noted in the margin.

From Agent, No. 55, February 1871.	
To " " 328, 11th " "	
To " " 349, 11th " "	
From " " 93, 25th " "	
Do. " " 99, 2nd March " "	
1 Drawing, No. 580—Plan of Calingulah No. 13.	
1 " Repairs to Calingulah No. 13.	
1 " Cross Section of do.	
1 Estimate.	

2. The old work was 547 feet long in openings of 3 feet between piers a foot thick carrying the tow-path, and its crest being level with the surface of the water in the canal when full, or 8 feet above bed, it was calculated to discharge, with one foot head, or when the water in the canal was at flood level, that is 9 feet deep, 161,000 cubic yards. The rain-fall in August 1870 showed this provision to be insufficient, and advantage is now being taken of the repairs that are necessary to remodel the work, and as the canal at this place receives the drainage of 28 square miles from which a surface discharge of one inch an hour would give 2½ million cubic yards, to adapt it for the safe discharge of nearly 2½ million cubic yards an hour.

3. The reconstruction proposed is to remove the existing superstructure which carries the tow-path—to lower the crest of the body wall 2 feet—reforming the superstructure in 55 bays of 8 feet span by piers 2 feet thick carrying arches on which the tow-path will be formed, by which means the flood waters will pass off 3 feet deep when the depth of water in the canal is 9 feet above bed. The 2 feet depth of water lost by lowering the body wall will, when necessary, be maintained by planks; the whole arrangement is shown in drawing No. 580, accompanying.

4. The proposal is in accordance with the principle discussed in paragraph 59 of my last Inspection Report for making the canal safe, except that the flood waters are intended to rise to 9 feet in the canal instead of being limited to 8 feet, and as the 1 foot extra depth may make a considerable difference in respect to the stability of the banks, I would prefer the crest of the solid work being fixed at 5 feet above bed, which the Chief Engineer agrees to.

5. The shutters for retaining the extra depth of water are 8-inch planks, which are intended to rest on a groove in the crest of the body walls and of the piers, and which the Chief Engineer describes are to be placed in position by men standing on a berm of rubbish in front. This part of the design does not seem to have been fully considered, and as it is quite possible that it may at times be necessary to remove the planks when the canal is full or nearly so, I would recommend hand-chains or ring-bolts being attached to each, so that either operation could be performed from the tow-path.

6. The estimate provides for rebuilding the whole of the body wall, which will only be done if, when the masonry is exposed, it proves unsound.

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7. I recommend the estimate for sanction, the amount being debitable, like other breach repairs recently sanctioned to "Capital."

From the Agent and Manager of the Madras Irrigation and Canal Company, to the Consulting Engineer for the Madras Irrigation and Canal Company, dated Madras, — February 1871.
No. 55.

I HAVE the honour to hand you copy of Mr. Latham's letter, No. 181, of 3rd February 1871, relative to the repairs to be made to Calingulah No. 13. The plans and estimate shall follow as soon as they reach me, and I shall feel obliged by your obtaining the sanction of Government as early as possible.

2. The plans and estimates for the alteration of the other calingulaks reached me some days since, but I was unfortunately obliged to refer the matter back to the Chief Engineer.

3. I am daily expecting his reply, for which I have telegraphed twice, and so soon as I receive it I will communicate with you.

From the Chief Engineer, to the Agent and Manager of the Madras Irrigation and Canal Company,
dated Kurnool, 2nd February 1871, No. 181.
No. 13 Cullingulah.

HEREWITH I have the honour to forward, for sanction of Government, proposed repairs for No. 13 Calingulah, breached in August last, at 24th mile stone of 2nd Section, and a proposed expenditure, not exceeding Rupees 6,130, thereon chargeable to Revenue.

2. The length of this calingulah is about 547 feet. Its crest consisted of openings 3 feet long between piers a foot thick carrying the tow-path. Taking the interference of the piers with the water-way equal to 3 inches on each side, the discharge of the calingulah when the canal is at flood level (1 foot above full water level) is 161,900 cube yards an hour; whereas the drainage area of the tank, which has its outlet over this calingulah, is 23 square miles. An inch of rain-fall on this area would be about $2\frac{1}{2}$ million cube yards.

3. If restored in the way now proposed, the discharge of the calingulah at flood level will be nearly 24 millions (221,600) cube yards an hour.

4. I have no doubt that the slight additional cost will be fully repaid by greater security in the banks. The security of the banks is necessarily lowered by the yearly drying up of the canal, and was none too much provided for in the original designs. Were the reservoirs complete and the water maintained, there would be probably no reason now to be anxious about the security of the banks, now that the weaker places have been discovered and made secure. As it is, it is expedient to adopt every precaution possible against occasional breaches, for not only are they found to be more prejudicial to revenue than was, I think, at first expected, but the chance of them is already high enough, owing to the yearly interruption of the supply of water. I therefore recommend that the repairs be executed as now proposed.

5. A body wall, which would be secure with only 1 foot of water flowing over, may not be so with 3 feet flowing over. The material for masonry on the spot is not good, I have therefore strengthened the calingulah by counterforts, and shown on the drawings the crest of both calingulah and apron wall as renewed; but in the estimate I have provided for the rebuilding of the mass of the body wall. This last will be done only if the present work, when exposed, seem insecure.

6. The escape is over worthless ground of gravel and rock into the original stream intercepted by the tank.

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Madras Irrigation and Canal Company, Hindry Division, 2nd Section, Main Canal.
REVENUE ACCOUNT.

Estimate for Repairs to Calingulah No. 13 in 25th Mile.

Quantity.	Particulars.	Rate.			Per.	Amount.		
		RS.	A.	P.		RS.	A.	P.
1,133	Cubic yards Rubble Masonry ...	3	0	0	C. yd.	3,399	0	0
146	Do. Arch work... ..	5	0	0	"	730	0	0
	Centering				"	250	0	0
560	Cubic yards pulling down old Masonry	0	4	0	C. yd.	140	0	0
	Masonry	0	4	0		81	12	0
327	Cubic yards, Removing tow-path...	1	0	0	8 "	124	6	0
995	Do. Backing							
694	Do. Excavating below ground line ...	1	0	0	6 "	115	10	8
	N grooved stones for face ...	2	0	0	Each	404	0	0
53	No shutters (teakwood) ...	5	0	0		275	0	0
30	Cubic yards, Metalling the roadway	0	4	0	C. yd.	7	8	0
381	Do. temporary dam ...	1	0	0	8 "	47	10	0
	Contingencies at about 10 per cent.					5,574	14	8
						555	1	4
	Total ..					6,130	0	0

KERNBOO,
Sd February 1871.

From the Consulting Engineer for the Madras Irrigation and Canal Company, to the Agent and Manager of the Madras Irrigation and Canal Company, dated Madras, 11th February 1871, No. 328.

Manager of the
No. 328.

REFERRING to your letters as per margin and estimate, amounting to Rupees 6,130, for remodelling Calingulah No. 13 in the 25th mile, which breached in August 1870, I have the honour to return Drawing No. 580, and request

No. 55, February 1871.
" 60, 10th " "

You will ask the Chief Engineer to show on it the mode in which the shutters are to be fixed and how to be raised; also to mention why they are placed at an angle as represented in the cross section. I understand from the drawing that it is intended to remove the old stone pitching, which formed an apron for an overflow, and to replace it by a water cushion, but no provision is made in the estimate for flooring the water cushion; this requires explanation.

—

to the Agent and

From the Consulting Engineer for the Madras Irrigation and Canal Company, to the Agent and Manager of the Madras Irrigation and Canal Company, dated Madras, 11th February 1871, No. 329.

From the Manager of the Madras Irrigation
No. 329.
From the drawings illustrative of the Chief Engineer's proposal for remodelling No. 13 Calin-
gulah, I understand that, when reconstructed,
it will be capable of discharging the possible
flood of water in a heavy fall of rain only at a depth of 3 feet above crest ; or, in other words,
that the Chief Engineer is prepared to subject the banks and walls in the upper portion of the canal
to the pressure and the wash of a maximum depth of nine feet of water above bed.
Paragraph 59 of my Inspection Report* I described at length what I understood, from
my conversation with the Chief Engineer, to be his

2. In paragraph 59 of my Inspection Report* I described at length what I understood, from conversation with the Chief Engineer, to be his intention in regard to the reconstruction of all works of this kind in the upper sections of the canal, and according to which the water in the

* G. O., No. 2,963, 7th December 1870.

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22nd March 1871.*

canal could never rise more than *eight* feet above bed, and, in the 10th paragraph of the same report, I expressed my readiness to support the Chief Engineer's proposal; but I am not prepared to say that I consider there is no doubt of the banks and walls referred to being capable of withstanding the pressure it is now proposed that they should be subjected to, and I request that I may be favoured with a decided expression of the Chief Engineer's opinion on the subject.

From the Chief Engineer, to the Agent and Manager of the Madras Irrigation and Canal Company, dated Kurnool, 20th February 1871, No. 279.

In reference to the letter, No. 329, of 11th instant, from the Consulting Engineer to you, *

* Your 178 of 14th instant.

I have the honour to reply that I understand the Consulting Engineer to desire to re-open the question of what is the most satisfactory discharge to give the calingulahs of the first four sections, and I propose to restore the breached Calingulah No. 13, at once, in a form to suit such general scheme of altered calingulahs as may be approved, and perhaps carried out hereafter.

2. The first point to determine is one depending on the wants of irrigation only, namely, what is the lowest height for the solid body wall of calingulahs which will be sufficient to ensure enough water passing down the canal up to the end of September during the rains. On this subject it is manifest that if the calingulah body walls be made needlessly *high*, they cannot be lowered without removing and replacing the superstructure, extending the aprons and outlets, and so having nearly half the work of the calingulah to do again. Whereas, if the body wall be too *low* it can be easily supplemented by building it up a little, or by leaving in a board of the sluices above the crest. Again, if the solid crests be laid too low, little harm is done, for additional calingulahs can be built at any time, and the old crests raised. But if the crests be made needlessly high it may lead to a needless extent of calingulahs being built at first.

3. In conversation with the Consulting Engineer, the solid crest was assumed as 18 inches below full water level. If the present calingulahs were lowered to this I believe they would, in the aggregate, be long enough to discharge an inch of rain an hour; but unfortunately the situation of many is such that their fair proportion of drainage could not get to them, while others would be overburdened. A quarter of an inch of rain can disperse itself up and down the canal, and escape over the present calingulahs; but an inch of rain is more than the canal can disperse, and the relief must be afforded close to the point at which the larger streams enter the canal. I therefore have supposed that the crests of the body walls of calingulahs will be lowered to 2 feet below water level. If this be agreed, then, I think, that Calingulah No. 13 should be restored on that pattern.

4. If so restored, it will discharge an inch of rain-fall an hour without raising the water more than a foot.

5. It did not occur to me that No. 13 Calingulah is on a site such that the outlet, on rock, can carry almost any discharge, and so is decidedly in a favourable position for trying a lower crest. I think that the design sent in would be safe if the crest were lowered to 3 feet below full water level. When the boards were out the canal would then be able to carry past the calingulah 197,000 cube yards of water an hour, instead of 259,000, which would pass a calingulah with a crest 2 feet below full water. I think the Company might build to either height, as the Consulting Engineer may choose.

6. I may add that I recommend the building up of all face walls and puddle core walls, except in cutting, to a height of 3 feet 6 inches above full water, so as to make them, not as strong, but stronger than lower parts of the bank, and I believe I have the Consulting Engineer's assent and that of Government to this measure.

7. I do not see why the reconstruction of No. 13 Calingulah need be delayed until it is settled what drainage calingulahs ought to be constructed to pass, whether one inch or two inches an hour. Any extension of the *length* of the calingulah would not be so useful, as to convert the long wall, a mile higher up the canal into a calingulah if further length be needed, nor need

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it wait until it is determined for what height of water as a maximum the canal should be made safe. These points affect the general question of calingulahs, but not this particular one.

No. 93.

FORWARDED to the Consulting Engineer, with reference to his letter of the 11th instant, No. 329.
MADRAS,
25th February 1870.
(Signed) F. H. HENSLOWE,
Agent and Manager.

From the Chief Engineer, to the Agent and Manager of the Madras Irrigation and Canal Company, dated Kurnool, 23rd February 1871, No. 295.

In reply to the Consulting Engineer's letter, No. 328, of the 11th instant, * I have the honour to say that I return the drawing corrected and intelligible.

* Your 179 of 14th instant.

2. The shutters lie on a groove on the crest, at the bottom, and on the sloping piers at the ends. They are inserted, in three pieces, from the platform of rubbish, etc., in front. It is not expected that they will require raising when water is against them; they are placed at an angle to prevent the wind blowing them over before water comes down the canal.

3. The old stone apron was simply dangerous, since the stones would wash out of it and carry away the tail wall. The rock will be amply firm to stand under the slight over fall, now proposed, into the water cushion.

No. 99.

FORWARDED to the Consulting Engineer with reference to his No. 328 of 11th ultimo.
2. The Drawing, No. 580, which accompanied the above letter is herewith returned, corrected.
(Signed) F. H. HENSLOWE,
MADRAS,
2nd March 1871.
Agent and Manager.

No. 537. ORDER THEREON, 22nd March 1871, No. 853.

IRRIGATION, No. 47.

UNDER the explanations furnished in these papers the Government sanction the estimate of Rupees 6,130 for restoring, on a modified design, the Calingulah No. 13 in the 25th mile of the Madras Irrigation and Canal Company's Canal, which was damaged during the heavy rains in August last.

(True Extract.)

Colonel, R.E.,
Secretary to Government.

To the Consulting Engineer for the Madras Irrigation and Canal Company.
" Agent and Manager for do. do.

Exd. S. T. Augustin.

Consulting Engineer
Sri Lanka Canal Company
Madras, 3rd March/71.

N^o 129.
To, - Colonel J. Carpendale
Engineer for S. L. C.
The Secretary to Government
Public Works Department.

Have the honor to submit drawings and
an estimate amounting to Rs. 6,130 for the re-
-storation in a modified form of Calingulah N^o 13 in
the 25th mile of the Main Canal which breached in
August last, and which are accompanied by the

From Agent N^o 55 - 26/7/71.
To - Do - 328 - 11 - do
To - do - 329 - 11 - do
From - do - 98 - 25 - do
To - do - 99 - 2 - March/72.
1 Drawing N^o 580 - Plan of
Calingulah N^o 13 -
1 - Repairs to Calingulah
N^o 13.
1 - Cross Section of do -
1 Estimate -

correspondence noted in the margin.
The old work was 54 feet long in opening
of three feet between piers a foot thick carrying
the flow path, and its crest being level with the sur-
-face of the water in the Canal when full, or 8 feet
above bed, it was calculated to discharge, with one
foot head, or when the water in the Canal was at
flood level that is 9 feet deep, 1,64,900 cubic yards.
The rain fall in August 1870 showed this provision
to be insufficient, and advantage is now being taken
of the repairs that are necessary to remodel the
work, and as the Canal at this place receives the
drainage of 28 square miles from which a surface dis-
-charge of one inch an hour would give 2 2/3 million
cubic

Proceedings of the Madras Government
Under date the 22nd March/71.
Read the following

From the Cons. Engrs for S.W.C. No. 129 of 3rd March 1871/

Under the explanations furnished in these papers the Govt. sanction the Estimate of Rs. 6,130 for restoring on a modified design, the Calingulah No. 13 in the 25th mile of the Madras Irrigation and Canal Company's Canal, which was damaged during the heavy rains in August last.

W.E.

To the Secy. to Govt. of Madras
For the Secy. to Govt. of Madras
23/3/71

S. M. 1871/1000/1000

By the Secy. to Govt. of Madras

The Secretary to Govt. of Madras

Under 3rd March/71

Engrs.

Under 3rd March/71
No 853-222 March/71
in a modified design
of Rs. 6,130 for the restoration
of the Calingulah No. 13
in the 25th mile of the
Madras Irrigation and
Canal Company's Canal,
which was damaged
during the heavy rains
in August last.

Ch 536

1000/1000/1000

1853.
Govt. of Madras.

PUBLIC WORKS.

To the Hon'ble Engineer in the
Madras Irrigation
Department.

Dated

Recd.

G. O., 22nd Dec 1871, No. 156.

Nos. 50-57

Calicut - The estimate
Rs 6150 for rebuilding, with
modified design, the bridge
No 13 in the 25 mile of the
Madras Irrigation canal
which was damaged during
the heavy rains in August
last, sanctioned.