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MADRAS RECORD OFFICE.

Government of Madras.

Public works DEPARTMENT.

G.O. No. 1475	Press
368-70	Mis.
Dated 15 5	1867.

Not to be folded or roughly handled

*Proceedings of the Madras Government, Public Works Department,
16th May 1867.*

No. 369. Read the following Endorsement of the Consulting Engineer for Railways, dated Madras, 7th May 1867, No. 140 :—

Read the following letter from the Agent and Manager of the Madras Railway Company, to the Consulting Engineer for Railways, dated Madras, 3rd May 1867, No. 164:

1. Adverting to your docket of the 8th January, No. 4, I have the honour to forward copy of a letter from the Chief Engineer, No. 237, dated the 1st instant, reporting the result of a survey made by Mr. Going of the site of a proposed tank at Goomanoor, on the 6th mile of District XII., North-West Line.

2. You will observe that Mr. Smart is of opinion that it would be undesirable for this Company to undertake the construction of tanks, by making use at certain favourable places of the embankments of the North-West Line beyond Gooty, inasmuch as the line runs through a black cotton soil, which would tend to the silting up of the tanks, and he therefore, for the present, abandons the idea of executing such works, and recommends the construction of the line in the manner originally proposed.

3. Three estimates of the cost of the works in connection with the Goomanoor tank irrigation are submitted.

From the Chief Engineer, to the Agent and Manager of the Madras Railway Company, dated Madras, 1st May 1867, No. 237.

1. Mr. Going has completed the surveys of three sites selected for tanks on the North-West Lines, and writes as follows :—

“ To enable you to decide on the financial merits of these proposed works, I have made out an estimate of the cost of constructing the Goomanoor tank on 6th mile of District 12.”

2. The estimate amounts to Rupees 90,038-14-7, but I have found it necessary to make certain alterations, chiefly in the price of iron work, which brings the estimate up to Rupees 1,01,172. This sum represents the difference between the cost of making the railway and that of adapting it to the purpose of a tank bund, with all necessary appliances. Thus—

Cost of constructing bund sluices, &c.	...	...	Rupees 1,32,596
Cost of Railway as originally designed	...	...	31,424

Difference Rupees 1,01,172

These estimates are appended.

“ The proposed Goomanoor tank has a catchment basin of 85 square-miles. In calculating the length of calingulah required, I have assumed the tank to be already full, the ground perfectly saturated, and that a fall of three inches in depth of rain finds its way into the tank within twenty-four hours. This gives, over an area of 85 miles, 4,11,372 cubic feet per minute. Taking three feet as the limiting depth of water flowing over the calingulah, we have 1,11,198 cubic feet discharge per minute for one foot of length (Beardmore Table 2), and consequently a calingulah of 369 feet clear length. Six girders of each 64 feet span would be required to clear this calingulah. It has been, however, suggested by Colonel Anderson, that the length of calingulah might be reduced by boarding up above the breast-wall in such a manner that, should occasion require, the boards may be removed either wholly or partially, thus creating a greater head of water over the calingulah, I have accordingly estimated for such a boarding and have made it 18 inches deep, the level of the breast-wall being lowered by that amount. By this means it will be possible to have a head of water of four and a half feet passing over the calingulah, and increased discharge reduces the clear width necessary for the calingulah to 201 lineal feet. The length of bridging is thus reduced to four spans of 64 feet each.

*Proceedings of the Madras Government, Public Works Department,
16th May 1867.*

"The accompanying drawing of calingulah shows the arrangement in which iron posts, cast of a plain pattern, and built into the breast-wall at intervals of four feet, give a bearing to two depths of two and a half inch boards, each nine inches wide and four feet long.

"The total capacity of the tank will be 98,36,000 cubic yards, and when full the area of land covered by water 860 acres. In estimating the area of irrigable land, the season of the year during which the heavy rain-fall occurs, will materially affect the consideration. Thus, suppose this to happen in the month of July or August, then it might be assumed that the evaporation from the tank during the growth of the crop would be in a considerable degree compensated by light rains falling throughout that season, whereas should the heavy rain-fall be deferred till October, as was the case last year, it is not probable that the waste in the tank due to evaporation would be restored before the crop had been cut. In this latter case, judging from the result of experiments made some years ago at Red Hills' tank, it would not be safe to assume a less waste from evaporation during the dry season than four-tenths of an inch daily. This taken for seventy-two days (the time a crop of paddy is said to require irrigation) and over 800 acres (the average area evaporated) amounts to a waste by evaporation of 30,97,000 cubic yards, leaving 67,39,000 cubic yards available.

"Assuming the commonly accepted theory that a crop of paddy requires 33 inches of water to bring it to perfection, these figures lead to the conclusion that 1,392 acres of paddy could be produced from Goomanoor tank in such a season as the last has been.

"Now taking the cost of construction as per estimate Rupees	90,038
"Adding compensation for 860 acres of land at Rupee 1 per acre	860

"The total expenditure will be Rupees	90,898
--	--------

On the other side we have 1,392 acres irrigated at say Rupees 5 per acre, Rupees 6,950, or 7½ per cent. on the outlay which it would consequently repay in twelve years."

3. This calculation must be altered to suit the altered estimate of outlay. Instead of Rupees 90,038 we have Rupees 1,01,172 + 860 = 1,02,032, and taking the receipts at Rupees 6,950 the return is slightly under 7 per cent., and this is on the assumption that the tank is filled every year, and that no deterioration takes place; but I think there can be very little doubt that a tank constructed, as this one would be, in black cotton soil, would silt up in the course of time, how long the process would take it is impossible for me to say, but I believe twenty years would be an outside limit to assign to it. The prospect is not therefore, in my opinion, sufficiently encouraging to induce the Company to undertake the work as a speculation, and as the Goomanoor tank is the most favourable of the three selected, the same observation applies to the other two. If you agree with me in the conclusion I have arrived at, the works will be proceeded with as originally designed.

1. Submitted for the information of Government.

2. In G. O. No. 3,201, dated 9th October 1866, this Government stated that they would be prepared to receive projects from the Agent and Manager, Madras Railway, for the construction of the embankments on the North-West Line, in such a manner as to enable them to serve the double purpose of carrying the rail and of storing water.

3. The Chief Engineer had anticipated that several sites along the line of Railway might be selected which would answer the purpose, and that it would be profitable to the Railway Company to construct the works, if they were credited with the additional revenue derived from the land irrigated.

4. It will be seen from the report now submitted by the Chief Engineer, on the most favourable of the several sites available, that he is of opinion that the Railway Company would not be justified in undertaking the construction of the Railway embankments, to adapt it as a tank bund.

*Proceedings of the Madras Government, Public Works Department,
16th May 1867.*

5. The plans have not been submitted, but I have seen them, and have learnt that they were very carefully prepared from a minute survey of the ground.

6. Mr. Smart's calculation of the quantity of water which would be obtained from the tank, and duty it would perform, are probably as accurate as our present state of knowledge on the subject will admit. He has designed the calingulah so as to allow of its discharging a quantity of water equal to that which would pass into the tank, from a fall of three inches of rain in twenty-four hours over the whole drainage basin—eighty-five square-miles. This scale of waterway I consider to be sufficiently liberal, as the ground traversed by the water-course is very absorbent.

7. The ordinary full supply of the tank would be 9,836,000 cubic yards, which is equivalent to a fall of rain of only 1½ inches over the drainage area, and Mr. Smart allows for the utilization of one supply only, and has, moreover, deducted nearly one-third for evaporation. The balance he considers capable of irrigating 1,392 acres of paddy, which is equivalent to allowing two cubic yards per hour per acre constant for 100 days.

8. The rain-fall in the Bellary District is so precarious, that it is very necessary to use the greatest caution in calculating on any specific supply of water; still I consider that in all seasons, excepting extraordinarily unfavourable ones, like that of last year, it would be safe to count on obtaining one full supply of the tank, without any deduction for evaporation, on the supposition that the loss by the latter would be made good by showers at intervals during the irrigating season.

9. The result of the present inquiry would probably have been considered sufficiently favourable to warrant the prosecution of the work, had it not been for the uncertainty of the tank continuing serviceable beyond a very limited period, in consequence of the extensive silting that would occur. Captain Fischer, in his letter to Government, No. 2,380, dated 23rd October 1866, had already pointed out the difficulty on this account, of forming tanks on the black cotton soil of Bellary.

10. The village of Goomanoor, where the survey of the work above described was carried on, is situated about twenty-two miles east of Bellary.

(Signed) J. C. ANDERSON, Lieut.-Colonel, R. E.,
Consulting Engineer for Railways.

No. 370. ORDER THEREON, 16th May 1867, No. 1,475.

RAILWAY, No. 27.

His Excellency in Council regrets to observe that, as the probable cost of adapting the embankments of the North-West Line of the Madras Railway to serve as tank bunds will leave a very small margin for profit from the application of the water retained by them to irrigation, and as the tanks proposed to be formed will be liable to rapid deterioration by the deposition of silt, the Madras Railway authorities are disposed to abandon the

Proceedings of the Madras Government, Public Works Department,
16th May 1867.

proposal which was laid before Government in the Consulting Engineer's letter of the 30th September last, No. 380.

(True Extract.)

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

To the Consulting Engineer for Railways.

"*Resume Sept.*"

Exd. S. T. Augustin.

Madras Railway,
Chief Engineer's Office,
Madras, 1st May 1867.

Dear Sir,

Mr. Faring has completed the surveys of three sites selected for tanks on the C. N. line and writes as follows:

To enable you to decide on the financial merits of these proposed works, I have made out an estimate of the cost of constructing the Poamanoor Tank on 6^{1/2} mile of District 12.

The estimate amounts to Rs 90,038.14.7 but I have found it necessary to make certain alterations, chiefly in the price of iron work which brings the estimate up to Rs. 101,172. This sum represents the difference between the cost of making the railway and that of adopting it to the purpose of a tank canal with all necessary appliances. Thus:

Cost of constructing Canal, sluices &c.	Rs. 1,32,596
Cost of railway as originally designed	Rs. 31,424
Difference	Rs. 101,172

These estimates are appended.

The proposed Poamanoor Tank has a catchment Basin of 85 square miles. In calculating the length of Colingulab required, I have assumed the Tank to be already full, the ground perfectly saturated and that a fall of 3 inches in depth of rain finds its way into the Tank within 24 hours. This gives over an area of 85 miles 411372 C. feet per minute. Taking 3 feet as the limiting depth of water flowing over the Colingulab, we have 111,988 C. feet discharge per minute for one foot of length. (See Annex Table 2) and consequently a Colingulab of 369 feet clear length. Six girders of each

64 feet span would be required to clear this Calingulah. It has been however suggested by Colonel Anderson that the length of Calingulah might be reduced by boarding up above the Breast wall in such a manner that, should occasion require, the boards may be removed either wholly or partially, thus creating a greater head of water over the Calingulah, I have accordingly estimated for such a boarding and have made it 18 inches deep; the level of the breast wall being lowered by that amount. By this means it will be possible to have a head of water of $4\frac{1}{2}$ feet passing over the Calingulah and increased discharge reduces the Clear width necessary for the Calingulah to 201 linear feet. The length of bridging is thus reduced to 4 spans of 64 feet each.

The accompanying Drawing of Calingulah shows the arrangement, in which iron plates, cast of a plain pattern, and built into the breast wall at intervals of 4 feet give a bearing to 2 depths of $2\frac{1}{2}$ inch Boards each, 9 inches wide and 4 feet long.

The total capacity of the Tank will be 9836000 C. Yards, and when full, the area of land covered by water 860 acres. In estimating the area of irrigable land, the season of the year during which the heavy rain fall occurs, will materially affect the consideration. Thus, suppose this to happen in the month of July or August, then it might be assumed that the evaporation from the Tank during the growth of the crop, would be in a considerable degree compensated by light rains falling throughout that season whereas, should the heavy rain fall be deferred till October, as was the case last year, it is not probable that the waste in the Tank due to

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evaporation would be restored before the crop had been cut. In this latter case, judging from the result of experiments made some years ago at Red Hills Tank, it would not be safe to assume a less waste from evaporation during the dry season than $\frac{4}{10}$ of an inch daily. This taken for 72 days (the time a crop of Paddy is said to require irrigation) and over 800 acres (the average area evaporated) amounts to a waste by evaporation, of 3097000 Cu. Yards, leaving 6739000 Cubic Yards available.

Assuming the commonly accepted theory that a crop of paddy requires 36 inches of water to bring it to perfection, these figures lead to the conclusion that 1392 acres of Paddy could be produced from Goomanoor Tank in such a season as the last has been.

Now taking the cost of construction as per Estimate Rs. 90038-
Adding Compensation for 860 acres of land at Rs. 1- per acre. 860-
The Total expenditure will be Rupees - 90898-

on the other side we have 1392 acres irrigated at say Rupees 5- per acre. Rs. 6950- or $7\frac{1}{2}$ per cent on the outlay, which it would consequently repay in 12 years.

This calculation must be altered to suit the altered estimate of outlay. Instead of Rs. 90038 we have Rs. 101172 + 860 = 102032, and taking the receipts at Rs. 6950 the return is slightly under 7 per cent and this is on the assumption that the tank is filled every year and that no deterioration takes place, but I think there can be very little doubt that a tank constructed, as this one would be, in black cotton soil would silt up in the course of time, how long the process would take it is impossible for me to say but I believe 20 years.

would be an outside limit to assign to it. The
prospect is not therefore in my opinion sufficient by en-
couraging to induce the Company to undertake the work
as a speculation and as the 'Joanmanas tank' is the
most favorable of the 3 selected, the same observation
applies to the other two. If you agree with me in
this conclusion I have arrived at, the work will
be proceeded with as originally designed.

Yours faithfully,
W. G. Swart,
Chief Engineer.

The Agent and Manager,

James C. [Signature]
Agent and Manager.

Completed

No. 164

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MADRAS RAILWAY COMPANY.

AGENT AND MANAGERS OFFICE.

Madras, 3rd May 1867.

From

Robert D. Clavin Esq.,
Agent and Manager of the M. R. Co.

To

Lieut. Colonel J. B. Anderson, A. E.,
Consulting Engineer for Railways.

SIR,

Adverting to your docket of the 8th January, N. 4, I have the honor to forward copy of a letter from the Chief Engineer, N. 237, dated the 1st instant, reporting the result of a survey made by Mr. Poing of the site of a proposed tank at Goomarsor, on the 6th mile of District XII, N. W. Line.

2. You will observe, that Mr. Smart is of opinion, that it would be undesirable for this Company to undertake the construction of tanks, by making use at certain favorable places of the embankments of the N. W. Line beyond Gooty, inasmuch as the Line runs through a black cotton soil which would tend to the silting up of the tanks, and he therefore for the present abandons the idea, of executing such works, and recommends the construction of the Line, in the manner originally proposed.

3. Three estimates of the cost of the works in connection with Goomarsor Tank

Navigation

109/1695/64

irrigation are submitted.

I have the honor to be,
Sir,
Your most Obedient Servant.
Wm. J. Martin
Agent and Manager.



1. Submitted for the information of Government
2. In G. O. No 3201 dated 9th October 1866, this Government stated that they would be prepared to receive, projects from the Agent and Manager, Madras Railway, for the construction of the embankments on the North West Line, in such a manner as to enable them to serve the double purpose of carrying the rail and of storing water.
3. The Chief Engineer had anticipated that several sites along the line of Railway might be selected which would answer the purpose, and that it would be profitable to the Railway Company to construct these works, if they were credited with the additional revenue derived from the land irrigated.
4. It will be seen from the report now submitted by the Chief Engineer on the most favorable of the several sites available, that he is of opinion that the Railway Company would

MADRAS RAILWAY.

From

The Agent and Manager.

To

The Consulting Engineer

for Railways

P. M. 1866/67

Dated 23rd Aug 1867.Recd. 4th "

No. 164

Forwarding Copy of a letter
from the Chief Engineer
reporting the result of a
survey made by the Chief
of the site of a proposed
of the line, on the 6th mile
of the line at No. 1, as also
the estimate of the cost of
the works to be executed with
the land, &c. &c.

would not be justified in undertaking the construction of the Railway embankment, to adapt it as a tank bund.

5. The plans have not been submitted, but I have seen them, and have learnt that they were very carefully prepared from a minute survey of the ground.

6. Mr. Smart's calculation of the quantity of water which would be obtained from the tank, and duty it would perform, are probably as accurate as our present state of knowledge on the subject will admit. He has designed the Calingulah so as to allow of its discharging a quantity of water equal to that which would pass into the Tank, from a fall of 3 inches of rain in 24 hours over the whole drainage basin - 85 square miles. This scale of waterway I consider to be sufficiently liberal, as the ground traversed by the water course is very absorbent.

7. The ordinary full supply of the Tank would be 9,831,000 cubic yards, which is equivalent to a fall of rain of only $1\frac{1}{3}$ inches over the drainage area - and Mr. Smart

allows

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allows for the utilization of one supply only, and has moreover deducted nearly one third for evaporation. The balance he considers capable of irrigating 1392 acres of Paddy, which is equivalent to allowing two cubic yards per hour per acre constant for 100 days.

8. The rainfall in the Bellary district is so precarious, that it is very necessary to use the greatest caution in calculating on any specific supply of water; still I consider that in all seasons excepting extraordinarily unfavorable ones like that of last year, it would be safe to count on obtaining one full supply of the Tank, without any deduction for evaporation; on the supposition that the loss by the latter would be made good by showers at intervals during the irrigating season.

9. The result of the present enquiry would probably have been considered sufficiently favorable to warrant the prosecution of the work, had it not been for the uncertainty of the Tank continuing serviceable beyond a very limited period, in consequence of

of the extensive sitting that would occur.
Captain Fischer in his letter to Government
No 2380 dated 23rd October 1866 had already
pointed out the difficulty on this account,
of forming tanks on the black cotton soil
of Bellary.

10. The village of Gormanow where
the survey of the work above described was
carried on is situated about 22 miles East of
Bellary.

Nadur
7th May 1867

J. Anderson

Consulting Engineer
for Railways

19/6

No 1475

PROCEEDINGS of the MADRAS GOVERNMENT.

Under date the 16th May 1867
Read the following

From the Consulting Eng^r for Railways
(Here enter No. 1100 dated 7. Aug 1867.)

His Excellency in Council regrets to observe that, as the probable cost of adapting the embankments of the North West Line of the Madras Railway to serve as tank bunds will leave a very small margin for profit from the application of the water retained by them to irrigation, and as the tanks proposed to be formed will be liable to rapid deterioration by the

W.M.

208 1867 Depts
In. of Govt. 1867. 16/5

RAILWAY DEPARTMENT.

From

The Cons^g. Engineer for Railways,

To

The Secretary to Government,
P. W. Dept.

Dated 7th May 1867.
Received 7th May 1867.

No. 140 -

Enclosures, No. 2 ✓

Observations on
a letter from the Asst.
Manager of the M. R. Co^{rs}
reporting the result of a
survey made by Mr. Gough
of the site of a proposed
tank at Goomanoor, on
the N. W. line - - -

2369

2. 11th May 1867. P. 13. 17.

No 1475-16 May 1867

the deposition of silt,
the Madras Railway
Authorities are disposed
to abandon the proposal
which was laid before
Govt. in the Consulting
Engineer's letter of the
13th Sept last No. 380.

W. B.

Confring for
* Revenue Department
Recd 17/5/67
* - u - 21/5/67

369-370

Pub. Works 1867 Department

Pro. of Govt. for Money

No. 1475

Pro. of the Madras Govt.
D^d 16th May 1867

Madras

Passing orders on
certain papers relative to the
abandonment by the Madras
Railway, of the proposed
construction of tanks in
Railway embankments of
the North-West Line.

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