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MADRAS RECORD OFFICE.**Government of Madras.***Public work* **DEPARTMENT.**

G.O. No. 2939	Press ~~Mis.~~
86-87	
Dated 5. 12	1870.

Not to be folded or roughly handled

No. 86. Read the following letter from the Consulting Engineer for the Madras Irrigation and Canal Company, to the Secretary to Government, Public Works Department, dated Madras, 5th November 1870, No. 86:—

I HAVE the honour to submit the documents noted in the margin, received with letter No. 416, of 28th September 1870, from the Agent of the Madras Irrigation and Canal Company, relating to the distribution works of the 1st Range under the 7th Section of the Main Canal.

Letter from Agent, No. 416, 28th Sept 1870.
Do. do. Chief Engineer, No. 1,369, 13th September 1870.
Do. do. Executive Engineer, Nundial, No. 461, 31st July 1870, with Memorandum and Sketch.

4 Masonry Plans.
1 Plan of Road Crossing.
1 General Plan.
6 Cross Sections.
1 General Abstract Estimate.
1 Do. Tabular Statement of Channels.
1 Abstract Estimate.
1 Detail do.

2. The area embraced in this scheme is the land to the west of the Main Canal, from the 96th to the 105th mile, lying between the canal and the river Caullee, and bounded on the south by the Nundial tank, and the land pro-

posed to be irrigated is 12,000 acres, all in the Nundial Talook.

3. The scheme consists of six main channels, aggregating 19 miles and 44 chains in length, each taking its name from a neighbouring village, and designated as follows:—

1. Bandyatmakoor.
2. Parlapully.
3. Eranapad.
4. Iawar Codoor.
5. Byapa Codoor.
6. Nundial and Kothopully.

From these, 31 smaller channels, called sub-mains, branch off, their total length being 34 miles and 31 chains; they are distinguished by the letters of the alphabet, and their courses, as well as those of the main channels, are clearly shown on the general plan, on which the position of each masonry work is also exhibited.

The masonry works are:—

- 6 Head Sluices.
- 28 Sluices.
- 29 Road Crossings.
- 1 Second-class Bridge.
- 13 Four feet masonry falls.
- 3 Small Culverts.
- 3 Aqueducts.

4. The distinguishing features of this project, and wherein it differs from others lately sanctioned, are, that the drainage water of the land is not made use of; the Executive Engineer considering that the nullahs, or vagoos, are too large to be utilized except as drainage channels, and that the main channels are only used for filling the sub-mains, from whence irrigation proceeds direct to the fields without the intervention of any smaller channels; also that the channels to a

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5th December 1870.*

considerable extent are carried on embankments. I would have preferred that a uniform system had been followed in respect to the arrangements, designation, and proportion of the distribution channels throughout the whole length of the canal; and it is surprising that each Executive Engineer was not furnished with general instructions on this point, and with lithographed copies of standard designs, and required to conform thereto in the main features, merely altering dimensions to suit local requirements. But I have no practical objections to make to the Executive Engineer's scheme on this head, except that the main channels, called "Iawar Codoor" and "Nundial Kothopully," are laid out to command all the land hitherto irrigated by the tanks that bear those names, and was to avoid filling the tanks, whence there may thus be some confliction of interests, as the tanks will continue to fill as they have done hitherto, and yet it will be impracticable to use the water in them for irrigation without interfering with the Company's channels.

5. In regard to the masonry works, the Chief Engineer proposes that they should as much as possible be constructed similar to those for the 5th Section,

No. 1,369, dated 13th September 1870. sanctioned in Government Order as per margin, and he sends up the plans prepared by Mr. Mathews, the Executive Engineer who got up this project, as alternative designs, as he has not had an opportunity of examining the site of each work, and some of the alternative designs may, he thinks, be improvements; but he has adopted the Executive Engineer's quantities and estimate of cost, requesting that he may have the option of working by the 5th Section designs. Looking to the general character of these works, their simple nature, and, in most cases, small size, I think it is advisable to leave the Chief Engineer to make alterations that each local circumstance suggests as advisable; the general character of the works in regard to capacity being uniformly maintained; the sanctioned expenditure not to be exceeded; and perfect stability by firm and sound foundations being insisted on.

6. The Executive Engineer has suggested, for the consideration of Government, a system of roads through the land to be watered, and which he proposes should be made suitable for traffic in all weathers; these roads are coloured brown in the plan, and their lines are judiciously selected in connection with the bridges that have been built over the main canal and in connection with the chief villages, and provision has been made in the estimates for crossings for these roads over the channels. It is very proper that such a project as that now submitted should include all necessary passages over the channels, and as the masonry works referred to are only six in number, of which but one is large, and the lines of road follow what are now village tracks, I think the works might be sanctioned, although the roads at present are only village tracks.

7. The particulars of the estimate are:—

	RS.
Six Sluices in Main Canal...	3,165
Main channels—Earthwork	14,670
Do. Masonry	3,620
Sub mains—Earthwork	21,450
Do. Masonry	1,755
	44,660

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for the irrigation of 12,000 acres, being an average of Rupees 3-11-7 per acre, which is decidedly very high. The rates in prior schemes being for—

	RS.	A.	P.
1st Range, 4th Section ..	1	15	3
2nd „ 4th „	1	11	2
5th Section	2	2	7
6th „	2	8	6

in which a contribution of 6 Annas per acre to the ryots for immediate distribution to the fields was included, while no such provision is made in the present estimates, but which, I think, may nevertheless prove necessary, raising the average to Rupees 4-1-7 per acre.

8. The Executive Engineer attributes the high rate in some degree to the broken nature of the ground; but the more expensive nature of the masonry works, and the channels being a good deal on embankment is the main cause, and this, I conclude, is the Chief Engineer's reason for wishing to adhere to the designs of the 5th Section. The contemplated expenditure on masonry is however small in comparison with that of the earthwork, and there is little use in saving on the first unless the expenditure on the last can be greatly reduced. It would have been better to carry the water on the surface between two banks a little apart if suitable contour lines for cuttings were unattainable, than to carry the water on the top of an embankment, although this plan would involve some waste of water; and, notwithstanding the great care and attention that has manifestly been given in getting up the project, I would have at once proposed that it should be returned for re-investigation, and an effort be made to lay out the channels at much less cost, but that I am unwilling to put any obstacle in the way of the completion of the works within the contract time. I feel it necessary, however, to record my apprehension that the estimate, high as it is, will be found insufficient to complete the distribution works on the present design, for, in regard to the capacity of the channels, I find the proportion between the discharge of the channels and the area to be irrigated is as follows:—

No. 1 Main Channel discharge	2½ cubic yards per hour per acre.
„ 2 „ „	1½ „ „ „
„ 3 „ „ less than 2	„ „ „
„ 4 „ „ „ 2	„ „ „
„ 5 „ „ „ 4	„ „ „
„ 6 „ „ about 2	„ „ „

9. The list of channels is very incomplete, and I am unable to state what the proportion is under each sub-main, but there can be little doubt they are each designed for about two cubic yards per hour per acre. The Chief Engineer says

there will be no difficulty under the sanction now asked in making the channels and masonry works capable of a maximum discharge of four cubic yards an hour for each acre, which he proposes to do; it merely involves, he says, raising some parapet walls a few inches, but the Executive Engineer, in his memorandum on the project, has explained that the banks are only one foot above the water

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5th December 1870.*

level, from which it will be understood that the earthworks will require a good deal of alteration to enable them to carry four cubic yards, though it is not necessary that they should be so constructed in the first instance.

10. Provision is made for passing the drainage under the channels on the basis of the discharge being one inch an hour of the area drained.

11. The channels are in some cases triangular in section, which I do not approve of, especially where they are on embankments; they would be more difficult to form, and could not retain their shape. The Chief Engineer does not notice this, and I am inclined to think that his hope is, if the gross amount of the estimate is sanctioned, that he would be able, in carrying out the work, to remodel the design and effect a saving in the cost.

12. I could not under any circumstances propose sanction being given to this scheme except conditional, as in similar preceding cases, on the masonry works being constructed of ample dimensions for discharging four cubic yards, and in consideration of the increased expenditure that would be necessary on this account, and the serious objections I have to the water being carried on embankments, the Government may perhaps consider it necessary that the Chief Engineer should report further on the subject.

The rates are:—

	RS.	A.	P.	
Rubble stone-in-chunam	4	8	0	a cubic yard.
Excavations for masonry works...	4	6	8 and 9	„ per Rupee.
Cutting channels			10	„
Forming embankment... ..			12	„

in none of which would I expect any saving to be effected.

13. The estimate amounts to Rupees 44,660, of which the sum of Rupees 2,045 was sanctioned as an advance in Government Order, No. 1,637, 8th July 1870, towards the construction of six sluices in the Main Canal.

No. 87. ORDER THEREON, 5th December 1870, No. 2,939.

IRRIGATION, No. 8.

WITH this letter the Acting Consulting Engineer for the Madras Irrigation and Canal Company submits an

estimate of Rupees 44,600 for distribution works to the lands proposed to be irrigated from the 1st Range of the 7th Section of the Main Canal.

2. Describing the distinguishing features of the scheme and the points wherein it differs from those already sanctioned for certain other sections of the canal, and comparing their relative costs, Colonel Carpendale explains that the estimated outlay on the present project, namely, Rupees 3-11-7 per acre, is decidedly very high, and that this result is due chiefly to the expensive nature of the masonry works and to the channels being to a considerable extent carried on embankments. Colonel Carpendale does not approve of this mode of conducting the water, and, in pointing out that the arrangement is both expensive and inefficient, he suggests that the water should be carried on the surface between two banks. In this opinion the Government fully concur.

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5th December 1870.*

3. The Acting Consulting Engineer brings to notice that the channels called Iawar Codoor and Nundial Kothopully are so laid out as to interfere with the distribution of water from the tanks bearing those names. The Government consider that the plans of the Company's officers should provide against any such interference by the channels being taken either over or under those leading from the tanks, and it is necessary, therefore, that this part of the project should be modified accordingly.

4. In paragraphs 9 and 11 Colonel Carpendale explains in what other respects he considers the scheme, as submitted by the Company's officers, to be defective, and remarks that any sanction that may be accorded to it should be conditional on the masonry works being constructed of ample dimensions for discharging on occasions four cubic yards per hour per acre as a maximum.

5. The Government see no reason to doubt that the scheme is open to all the objections raised to it by Colonel Carpendale, and they accordingly resolve to direct that it be modified in accordance with the suggestions of that officer. The plans and estimates will, therefore, be returned, but to prevent any delay in the execution of the works, His Excellency in Council sanctions an advance of Rupees 25,000 for their prosecution.

(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.

Ed. S. T. Augustin.

Consulting Engineer's Office
Irrigation & Canal Company
Madras, 5th Nov 70.

No 86.
Sir,
Colonel Carpenter G.O.
Consulting Engineer for S. & C. Co.
The Secretary to Government
Department of Pub. Works.

I have the honor to submit the documents
sent from Govt No 416-106 in the margin received with letter No 416
of 28 Sept 70.
Ch. Engr. No 1369 of 20 September 1870 from the Govt of the
Madras Irrigation and Canal Company relating
to the distribution works of the 1st Range under
with memo: 1461-31 July.

4 Masonry Plans.

1 Plan of road crossing the 7th Section of the Main Canal.

1 Genl. Plan

6 Cross sections

1 Genl. Abstr. Estimate

1-2 Tabular Stmt. of chann.

1 Abstr. Estimate

1 Detail

2. The area embraced in this scheme is the
land to the west of the Main Canal from the 96th
to the 105th mile - lying between the Canal and the
river Culee, and bounded on the South by the
Nundial Tank, and the land proposed to be
irrigated is 12,000 acres, all in the Nundial
Taluk.

3. The scheme consists of six Main chan-
nels aggregating 19 miles and 44 chains in
length, each taking its name from a neigh-
bouring village, and designated as follows:

1 Bandyatmakoor

1. Pandyaathakoor.
2. Parlapully.
3. Erganapiad.
4. Sawar Codoor.
5. Byapa Codoor.
6. Mundial and Nothapully.

From these, 31 smaller channels, called sub mains, branch off, their total length being 31 miles and 31 chains; they are distinguished by the letters of the Alphabet, and their courses, as well as those of the main channels, are clearly shown on the General Plan, on which the position of each masonry work is also exhibited.

The masonry works are:-

- 6 Head sluices
- 28 Sluices
- 29 Road crossings
- 1 Second class Bridge
- 13 Four feet masonry falls
- 3 Small culverts
- 3 Aqueducts.

4. The distinguishing features of this project, and wherein it differs from others lately sanctioned, are, that the drainage water of the land is not made use of, the Executive Engineer considering that the nullahs or vadoos are too large to be utilized except as drainage channels, and

and that the main channels are only used for filling the sub mains, from whence irrigation proceeds direct to the fields without the intervention of any smaller channels, also that the channels to a considerable extent are carried on embankments. I would have preferred that a uniform system had been followed in respect to the arrangements, designation, and proportion of the distribution channels, throughout the whole length of the Canal, and it is surprising that the Executive Engineer was not furnished with general instructions on this point, and with lithographed copies of standard designs, and required to conform thereto in the main features, merely altering dimensions to suit local requirements, but I have no practical objections to make to the Executive Engineer's scheme on this head, except that the main channels, called "Sawar Codoor" and "Mundial Nothapully" are laid out to command all the land hitherto irrigated by the tanks that bear those names, and so as to avoid filling the tanks, whence there may thus be some confliction of interests, as the tanks will continue to fill as they have done hitherto, and yet it will be impracticable

to use the water in them for irrigation with-
out interfering with the Company's channels.
5. In regard to the masonry works, the Chief
Engineer proposes that they should as much
as possible be constructed similar to those
for the 5th Section sanctioned in Government
Order, as per margin, and he sends up the plans No. 1369-13 Sep/10
prepared by Mr. Matthews, the Executive En-
gineer, who got up this project, as alternative
designs, as he has not had an opportunity of ex-
amining the site of each work, and some of
the alternative designs may he thinks be im-
provements, but he has adopted the Executive
Engineer's quantities and estimate, of cost,
requesting that he may have the option of work-
ing by the 5th Section designs. Looking to the
general character of these works, their simple
nature, and in most cases small size, I think
it is advisable to leave the Chief Engineer to
make alterations and that each local circum-
stance suggests as advisable - the general cha-
racter of the works in regard to capacity,
being uniformly maintained, the sanctioned
expenditure not to be exceeded, and perfect sta-
bility by firm and sound foundations being
insisted

insisted on. - 1-3
6. The Executive Engineer has suggested
for the consideration of Government a sys-
tem of roads through the land to be watered
and which he proposes should be made suit-
able for traffic in all weathers - these
roads are colored brown in the plan, and their
lines are judiciously selected in connection
with the bridges that have been built over
the Main Canal and in connection with the
chief villages, and provision has been made
in the estimates for crossings for these roads
over the channels. It is very proper that
such a project as that now submitted should
include all necessary passages over the
channels, and as the masonry works referred
to are only six in number of which but
one is large, and the lines of road follow what
are now village tracks, I think the works
might be sanctioned, although the roads at
present are only village tracks. -

7. The particulars of the estimate
are -

are:-

6 sluices in Main Canal Rs. 3165
Main channels earthwork Rs. 14,670
" " " masonry " 3620
Sub mains earthwork Rs. 21,450
" " " masonry " 1755
Total Rs. 44,660

for the irrigation of 12,000 acres being an average of Rupees 3.11.7 per acre which is decidedly very high - The rates in prior schemes being for:-

1st Range 4th Section - Rs. 1-15-3
2nd " " " " " 1-11-2
3rd " " " " " 2-2-7
4th " " " " " 2-0-6

in which a contribution of six annas per acre to the ryots for immediate distribution to the fields was included, while no such provision is made in the present estimates, but which I think may nevertheless prove necessary, raising the average to Rupees 4.1.7 per acre.

The Executive Engineer attributes the high rates in some degree to the broken nature of the ground, but the more expensive nature of the masonry works, and the channels being a good deal an embankment is the main cause, and this I conclude is the Chief Engineer's reason for wishing to adhere

adhere to the designs of the 5th Section. - The contemplated expenditure on masonry is however small in comparison with that of the earthwork, and there is little use in saving on the first unless the expenditure on the last can be greatly reduced. It would have been better to carry the water on the surface between two banks a little apart if suitable contour lines for cuttings were unattainable, than to carry the water on the top of an embankment, although this plan would involve some waste of water, and, notwithstanding the great care and attention that has manifestly been given in getting up the project, I would have at once proposed that it should be returned for re-investigation, and an effort be made to lay out the channels at much less cost, but that I am unwilling to put any obstacle in the way of the completion of the works within the contract time, I feel it necessary, however, to record my apprehension that the estimate, high as it is, will be found insufficient

insufficient to complete the distribution works on the present design, for in regard to the capacity of the channels I find the proportion between the discharge of the channels and the area to be irrigated is as follows.

No. 1 Main channel Discharge $2\frac{1}{4}$ C. W^s per hour per acre.
 " 2 " " " " " " " " " "
 " 3 " " " " less than 2 " " " "
 " 4 " " " " " " " " " "
 " 5 " " " " " " " " " "
 " 6 " " " " " about 2 " " " "

The list of channels is very incomplete and I am unable to state what the proportion is under each sub-main, but there can be little doubt they are each designed for about two cubic yards per hour per acre. The Chief Engineer says there will be no difficulty under No. 1369-1369/12 the sanction now asked in making the channels and masonry works capable of a maximum discharge of four cubic yards an hour for each acre, which he proposes to do, it merely involves, he says, raising some parapet walls a few inches, but the Executive Engineer in his Memorandum on the project has explained that the banks are only one foot above the water level, from which it will

will be understood that the earthworks will require a good deal of alteration to enable them to carry four cubic yards, though it is not necessary that they should be so constructed in the first instance.

10. Provision is made for passing the drainage under the channels on the basis of the discharge being one inch an hour of the area drained.

11. The channels are in some cases triangular in section which I do not approve of, especially where they are on embankments - they would be more difficult to form, and could not retain their shape. The Chief Engineer does not notice this, and I am inclined to think that his hope is if the gross amount of the estimate is sanctioned that he would be able, in carrying out the work, to remodel the design and effect a saving in the cost.

12. I could not under any circumstances propose sanction being given to this scheme except conditional, as in similar preceding cases, on the masonry works being constructed of ample dimensions for discharging four cubic yards, and in consideration of the increased expenditure.

in expenditure that would be necessary on this account, and the serious objections I have to the water being carried on subalterns, the Government may perhaps consider it necessary that the Chief Engineer should report further on the subject.

The rates are:

Rubble stone in chunam Rs. 4-8-0 a Cubic
Excavations for masonry works - 4-6-849-0 per rupee.

Cutting channels - 10-0-0

Forming subalterns - 12-0-0

in none of which would I expect any saving to be effected.

13. The estimate amounts to Rupees 44660 of which the sum of Rupees 2045 was sanctioned as an advance in Government Order No 1637 of 10th July 1870 towards the construction of six sluices in the Main Canal.

I have the honor to be,

Sir,

Your most obedient servant,

J. G. M. D. C. S.
Consulting Engineer for the Company.

C. M. B.

Public Works Department
Dy. of Engrs. & Surveyors
From ~~18-11-53~~
The Consulting Engineer
To
The Secretary to Govt. D.O.

Dated 5th Nov/70.
Recd. 9th

Encl: 19.

Submits with remarks
letter from the Dy. Engr. with
accompaniments relative
to the distribution works
of the 1st Range under the
7th Section Main Canal.

N^o 2939 - 5th Dec/70.

86.
C. 16. Nov 1870 or 195

In Public Works Department
N^o 2939
Proceedings of the Madras Government
Under date the 5th Dec/70
Read the following

From The Cons. Engineer
for J. & C. Co. (H. E. N^o 86 of 5th Dec/70)

N^o
With this letter the
Acting Consulting Engr.
for the Madras Irrigation
and Canal Company sub-
mits an estimate of
Rs. 44,000 for distribution
works to the lands pro-
posed to be irrigated
from the 1st Range
of the 7th Section of
the Main Canal.
Describing the

distinguishing features
of the scheme and the
points wherein it differs
from those already sanctioned
for certain other sections
of the Canal, and com-
paring their relative
costs, Col. Carpendale
explains that the esti-
mated outlay on
the present project
viz Rs 3-11-7 per acre
is decidedly very high
and that this result
is due chiefly to the
expensive nature of
the masonry works
and to the channels

215
being to a considerable
extent carried on
embankments. Col.
Carpendale does not
approve of this mode
of conducting the
water, and in pointing
out that the arrange-
ment is both expensive
and inefficient, he
suggests that the water
should be carried on
the surface between
two banks. In this
opinion the Government
fully concur. The Acting Com-
missioner has no objection
that the channels

called Samar Codon
and Apudial Kotho.
-pally are to laid out
as to interfere with
the distribution of
water from the tanks
bearing those names.
The Govt consider that
the plans of the Company's
Officers should provide
against any such
interference by the
channels being taken
either over or under
those leading from
the tanks, and it is
necessary therefore that
this part of the project

should be modified
accordingly.

In paras 9 and 11 Col
Carpendale explains in what
other respects he considers the
Scheme as submitted by the
Company's Officers to be defective,
and remarks that any sanc-
-tion that may be accorded
to it should be condi-
-tional on the masonry
works being constructed
of ample dimensions for
discharging on occasions
four cubic yards per
hour per acre as a
maximum.

The Govt see no
reason to doubt that
the scheme is open to

all the objections raised
to it by Col. Carpendale,
and they accordingly
resolve to direct that
it be modified in
accordance with the
suggestions of that
officer. The plans and
estimates will therefore
be returned, but to
prevent any delay
in the execution of
the works, His Excellency
in Council sanctions
an advance of Rs 25000
for their prosecution.

W. E.

To
The Engineer & S. V. Company
Agent and Manager
Decr 6/12/10.

124537

Govt. of 1870 Madras.

PUBLIC WORKS.

To The Consulting Eng^r
for the Madras
Irrigation and
Canal Company

Date

Recd.

Encl.

G. O., 5th Dec 1870, No. 2939

Nos. 86187

Distribution Works - Raising Orders
Re the letter from the Eng^r for
the Madras & Co. submitting
plans & estimates of Rs. 44,600
for distribution works in the
1st Range of the 7th Section of the
Main Canal.

Recd 6/12/70