Public Works (189) Department.

G.O., No. 875 I

DATED 17 Oct 99

18/10/99

[Despatch Abstract.]

Thadapally channel, Coimbatore Dt.

The estimate of Rs 7,450 for resluicing the ——, sanctioned

110

[P. W. 16. / 150—16-9-99.]

17-10-99

18/10

BACK PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.

FURTHER PAPERS.

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.

IRRIGATION.
ACCOUNT.

Government (1899) of Madras.

PUBLIC WORKS.

Recd.	1899.	*Enclosures*
Regd.		*Spare copies*

G.O., No. 875 I., 17th October 1899.

OCTOBER.

Thadapally Channel, Coimbatore District

The estimate of Rs. 7,450 for resluicing the —, sanctioned.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Irrigation.
Account.

READ—the following papers :—

From A. H. GARRETT, Esq., Superintending Engineer, IV Circle, to the Chief Engineer for Irrigation, dated Camp Sengapally, 12th July 1899, No. 174/I.

I have the honour to forward an estimate for resluicing the Thadapally channel, miles 32—37, and its branch the Ammapalayam channel.

2. The dimensions of the pipes have been fixed, with reference to Professional Circular No. 45 C., dated 2nd December 1898, and the Executive Engineer states that screw-gearing shutters are necessary owing to the depth of water and to prevent wastage in distribution.

3. The operator diagram, prepared by the Assistant Engineer, has already been sent to you.

4. I have had a longitudinal section of the Thadapally channel prepared from the resluicing statement showing sill levels of the new sluices. I think the sills in many cases have been placed too high, and the number of new sluices allowed is, I consider, in excess of requirements.

ENCLOSURE.

REPORT to accompany the estimate for resluicing the Thadapally, 32 to 37 miles.

	RS.
Estimate	6,040

The proposal is to resluice the first five miles of the kar section of the Thadapally channel. The kar is a four-month crop planted in April and harvested in July, and water is first let in the Thadapally in the second week of April for this crop, when the river is low, and only about the middle of June the ayan section, viz., head to 32 miles, is opened for cultivation. Thus only for about a month and a half from the middle of June to the end of July the channel supplies for the total kar and ayan ayacuts, but generally during these months the channel use to get its full supply from the river.

Except in specially dry years which do not occur even once in ten years the head sluice gauge ranges from 3·00 to 7·50 during the months April, May and June, giving a discharge ranging from 118 to 708 cusecs, of which the lowest is ample to supply adequately 4,000 acres. On the contrary even in the most favourable years the kar ayacut, about 3,000 acres, never got a continuous supply from 32 to 48 miles and that is solely owing to the difficulty in regulating the existing old type sluices and open cuts.

The present proposal will not only minimise the difficulties in the regulation and enable a continuous supply being given to the whole of the kar ayacut, but it is hoped it will effectively put an end to the necessity for granting a lot of remissions every year, and the increase of revenue will fully repay the cost of the improvements in the course of a few years.

2. The estimate has been prepared in accordance with the instructions contained in Mr. Malet's notes on resluicing non-deltaic channels except in a few particulars in which deviation from the instructions was found necessary after a careful examination of the circumstances peculiar to this channel.

3. The success of the improvements will totally depend on the accuracy of the ordinary water levels on which the calculations are based. The ordinary water level marks and the full supply level marks are distinctly and correctly discernible on masonry works in the old channels only in a few miles from the head, whereas beyond that the wastage increases to such an extent as to give an ordinary water level much below the probable water level after the improvements.

In the present case there is a full supply mark showing the levels when the sluices in the first half of the kar section are closed completely, and it is too high a level to base the design of the sluices on.

There is also another full supply level mark showing the level when the first half of the kar section is opened for cultivation and shows the full supply reading, viz., 5·10 at the head of the kar section, and vanishes to nothing at the end of the same section.

The channel at full supply at 32 miles the head of the kar section discharges 175 cusecs, and the total kar ayacut is not over 3,000 acres. Allowing a duty of 30 acres per cusec, the channel should discharge 75 cusecs into the Ananthasagram tank in which it empties even when the whole kar ayacut is supplied, but under the existing conditions as already stated the water never passes beyond 42 miles of the Thadapally leaving the remaining 6 miles empty when the first half of the kar section is opened for cultivation.

Therefore it is quite clear the state of things will be utterly different after the improvements, and the designs should be based on the water levels after the improvements and not on the existing water level marks.

4. As the water levels are the resultant of the total condition of the whole channel, no arithmetical process is practicable for deducing them. A graphic and mechanical contrivance for drawing the water level line for any given depth and discharge at the tail end and given discharges at different points of the channel has been designed to suit either the Bazin's or the Kutler's formula for calculating the discharges of rivers and channels for the purpose. The levels obtained by this method agree very well with the results of a few experiments made to test its accuracy, and can be hoped they will agree with the water levels in the channel after resluicing.

5. The capacity of the channel at 32 miles is 175 cusecs and allowing roughly a loss in the upper 32 miles of the channel of 20 per cent. due to evaporation, percolation, usage for drinking purposes, etc , the head sluice should discharge 210 cusecs to give full supply at the head of the kar section.

The head sluice is capable of discharging that quantity with the rear gauge at 4·00. For any rise over this at the head sluice the extra quantity of water escapes over weirs in the bank above 32 miles. and the gauge at 32 miles remains constant and reads 5·10. Hence 5·10 feet on the gauge which corresponds to the level 196·15 is taken to be the full supply level at 32 miles and the corresponding levels from 32 to 37 miles allowing for the quantity of water that will be taken off by the lands in that length has been graphically deduced and entered in the resluicing statement.

6. As for the ordinary supply it should, under any circumstance, be enough for the whole ayacut at the duty allowed for the channel.

A duty of 40 acres per cusec is found to answer well in the ayan section, but as the kar crop requires more water than the ayan crop for any given period a 30-acre per cusec duty has been allowed in designing the sluices. At that duty and also allowing for the probable increase in the wet ayacut after the improvements, the ordinary supply at the head of the kar section should be about 120 cusecs. Hence the water levels 195·25 which gives a discharge of 120 cusecs has been taken as the ordinary water level at the head of the kar section and the corresponding levels in the length of the channel 32 to 37 miles after allowing for diminution in the discharge all along on account of the supply being taken by the lands in that length has been graphically deduced and the sluices designed to discharge the required quantities at that level.

7. Mr. Malet suggests in his notes to deduce the approximate proper bed level of the channel by drawing a line roughly parallel to the water level and to fix the sill levels of the new sluices, with reference to the levels so arrived at. The water level referred to is apparently the existing water level and as already explained in paragraph 4 that cannot be taken as a basis for any purpose. Even supposing that the approximate proper bed level is drawn roughly parallel to the water level graphically deduced, the principle leads to inconsistencies and it is fared if the sills are fixed with reference to that bed level; the improvements, though not in a short time, will, when the channel bed is scoured by the sluices to that level, end in failure.

For instance, taking the section of the channel at 36/2 miles, the approximate proper bed level, if assumed to be roughly parallel to the water level, will be nearly 2 feet below the present bed level. Though the bed level is high the section at that point is very broad, compared with the sections above and below and the $\frac{AW}{\sqrt{W+4}}$ curve widens out rapidly, so that the full supply is discharged at that section with a depth of only 3 feet without causing any heading up. Therefore, by fixing the new sluice at the abovesaid approximate bed level, the channel bed will, in course of time, be scoured out partly by the sluices themselves and mostly by the ryots whose tendency is to lower the bed to the sill levels of their sluices and thus deprive of the supply to the lands lower down, when the channel flows low. The gradual lowering of the bed will also lower the water level and the high lands which now fair quite well will surely be affected then. Therefore, the bed level proper for the water level on which the designs and calculations are based is the present bed level and sections of the channel which have given the particular water level.

On another equally important consideration of avoiding litigation also, it is necessary to maintain the present bed level and sections, unless the proposal is to extend and to improve the channel, but there is not the least advantage in extending this portion of the channel and if at all the Thadapally is extended at any future time it is the Coogalore branch which is a high level channel now about 10 miles in length taking off at 22 miles of the Thadapally that has all the advantages for extension, and this portion of the channel should only be treated without allowing for any such prospect.

Taking the section of the channel at 35/4 which is high as well as crooked on account of its having been cut through rock, it is found on calculation that the water heads up about 6 inches and the backing affects about 14 furlongs above it. This state of things existed from the time the channel was constructed, and such of the high lands above that point as can be commanded by the raised level of water have all been brought under wet cultivation and the effect of now deepening and widening the section will put the said high lands to inconvenience.

Further, it serves no useful purpose to regrade and resection the channel except that it reduces the inconvenience in the calculations, and it is not worth while spending large sums for that sake alone; a crooked section far off from the head sluice never affects the total discharge of the channel and there is no objection in maintaining such sections on an engineering point of view.

Under these the present improvements have been determined with reference to the present bed level and sections omitting all the principal irregularities due to the local scours caused by very low level sluices.

8. The combination of the old sluices and the patterns of the new sluices, with all the necessary levels and informations, are clearly noted in the resluicing statement and needs no further explanation in this report.

9. The cisterns with projecting walls for protecting the dividing bunds between the distributary channels constructed in the Thadapally channel, 11 to 18 miles, are found to answer very well and they are also much cheaper than square or polygonal cisterns with side walls long enough to allow for the dividing bunds. The same designs have been adopted in preparing this estimate.

On the same considerations as stated in paragraph 4 of the report accompanying the estimate for improving the Ammapalaiyam branch channel, cast iron pipes have been provided for in preference to any other.

10. Of the ayan section of the channel, the first 22 miles have been more or less effectively resluiced and the regulation in that section is comparatively easy. But nothing has been done in the kar section and it is essential to resluice at least the first bit, 32 to 37 miles, before the commencement of the wet cultivation season in April 1899.

17th December 1898. (Signed) P. V. MANICKAM NAYAKAR,
Assistant Engineer.

No. 186 I.

Note by the Chief Engineer for Irrigation.

The Superintending Engineer, IV Circle, submits an estimate, amounting to Rs. 6,040, for resluicing a further portion of the Thadapally channel in the Coimbatore district, the first 22 miles of which have been already resluiced. In submitting the estimate the Superintending Engineer expresses the opinion that the sills of the new sluices are proposed at too high a level in many cases and that the number of new sluices is in excess of requirements.

2. With reference to the first point it is observed that the levels proposed for nearly all of the new sluices are lower than the old ones, and that in the few cases where they are higher the difference is only a few inches and the depth of channel considerable. With reference to the second point remarked on by the Superintending Engineer, it would appear that the estimate provides for 57 new sluices to replace 174 old sluices as noted in the margin. In these circumstances it is recommended that the estimate be sanctioned, but the Superintending Engineer should, with reference to his remarks on the levels of some of the new sluices, have the conditions which determine the proper level for these sluices again examined before the work is put in hand.

42 new sluices to replace 125 old sluices in the main channel.
15 new sluices to replace 49 old ones in the Ammapalaiyam branch.

18th September 1899. (Signed) W. HUGHES,
Chief Engineer for Irrigation.

Order—No. 875 I., dated 17th October 1899.

The following estimate is sanctioned :—

Irrigation.
43. Minor Works and Navigation.
Minor Works for which Capital and Revenue Accounts are kept.
Thadapally Channel System.
Open Capital Account.
2. Main Canals and Branches.
3. Regulators.
Resluicing the Thadapally Channel.

Estimate—

	RS.
I. Works	**6,040**
II. Establishment	**1,389**
III. Tools and plant	**21**
Total ...	**7,450**

2. This sanction is registered as No. 75 I. of 1899–1900 and will expire on the 31st March 1901.

3. The attention of the Superintending Engineer, IV Circle, is drawn to the remarks in the concluding portion of paragraph 2 of the foregoing note by the Chief Engineer for Irrigation.

(True Extract.)

Under Secretary to Government,
Irrigation Branch.

To the Chief Engineer for Irrigation.
„ Superintending Engineer, IV Circle,
with twelve enclosures.
„ Examiner of Public Works Accounts.

Exd. T. K. Narayana Aiyangar.

Public Works (1899) Department.

CURRENT No. 8426

8759

Order

From The Chief Engineer for Irrigation

No. 186 I.

Dated 18. 9. 99

Received } 13-10-99

Registered

Enclosures 12 1 file

Spare copies.

SUBJECT.

Thadapally Channel—Estimate of Rs 7450 for realining a further portion of the —. Recommending with remarks for sanction the —.

Fld

BACK PAPERS.

No.	Date.

FURTHER PAPERS.

No.	Date.

PROCEEDINGS OF THE MADRAS GOVERNMENT.

Estimate of Rs 7450 for resluicing the Thadapalli Channel

UNDER date the

READ the following

From the Supg: Engineer 4th Circle – No. 174. I. dated 12th July 1899.

Note by the Chief Engineer for Irrigation
No 186 Irry. 18-9-99

8 P

Issue

W.H.
I
6/10/99

W.S.
6.10

The Superintending Engineer, 4th Circle, submits an estimate, amounting to Rs 6040 for resluicing ~~further portion~~ a further portion of the Thadapally channel in the Coimbatore district, the first 22 miles of which have been already resluiced.

In submitting the estimate the Superintending Engineer expresses the opinion that the sills of the new sluices are proposed at too high a level in many cases and that the number of new sluices is in excess of requirements.

2. With referance to the first point it is observed that the levels proposed for nearly all of the new sluices are lower than the old ones, and that in the few cases where they are higher the differance is only a few inches and the depth of channel considerable. With referance to the second point remarked on by the Supg: Engineer it would appear that the estimate provides for 57 new sluices to replace 174 old sluices as noted in the margin. In these circum-stances it is recommended that the estimate be sanctioned, but the Supg: Engineer should, with referance to his remarks on the levels of some of the new sluices have the conditions which determine the proper levels for these sluices again examined before the work is put in hand.

42 new sluices to replace 125 old sluices in the main channel.
15. new sluices to replace 49 old ones in the Ammapolein branch

G.O

Prepare [illegible]

A.E.H
5.10.99

No. 875 I 17.10.99

Order thereon

The following estimate is sanctioned:—

Irrigation

43. Minor works and Navigation

Minor works for which Capital and Revenue accounts are kept

Khadapalli channel system

Open Capital account

2 Main canals & Branches.

3. Regulators.

Resluicing the Khadapalli channel.

Estimate—

	Rs.
I. Works . . .	6040.
II Establishment –	1389.
III Tools and plant	21
Total –	7,450

2. This sanction is registered as No. 75 I of 1899-1900 and will expire on the 31st March 1901.

3. The attention of the Supg: Engineer, 4th Circle is drawn to the remarks in the concluding portion of para 2 of the foregoing note by the Chief Engineer for Irrigation.

JH
15/9
/98.

WH.
18.9.99.

D 3/11/99

To,
The Chief Engineer for Irrigation
" Supg: —do— 4th Circle, with
12 enclosures.
" Examiner of P.W. Accounts.

E. L. Form No. 1 (a)—400—27-3-99.

Public Works (1899) Department.

CURRENT No. 44 C.I.

From The Supdg. Engineer
4th Circle

Order

No. 174/I.

Dated 12th July 1899
Received } 17 do —
Registered }
Enclosures 12. ✓
Spare copies. ✓

SUBJECT.

Thadapally Channel.
Submits estes. &c. amtg. to Rs 60,00 for re-sluicing the —
D.E.S.

JH
18/7

Note
For C.E.'s instructions about resluicing please see paper flagged "Q."

Rs. 1
8426/99

ACW
21/7/99

ACW
21/7/99

BACK PAPERS.

No.	Date.
I 10 C I	5-7-98
R 25 C I	15-6-98
I 1 C I	30-1-98

FURTHER PAPERS.

No.	Date.

Office of the Superintending Engineer,
~~FOURTH CIRCLE.~~

No. 174/I

Camp Sengapally ~~Coimbatore~~ 12th July 1899.

From A. H. Garrett Esq
Superintending Engineer,
Fourth Circle, Coimbatore.

18

To
The Chief Engineer
for Irrigation

CHIEF ENGINEER
FOR IRRIGATION.
17 JUL. 1899
44 C.I.

Enclosures. 12×

2 ~~Estimate.~~
2 ~~Reports~~
2 Data sheets.
1 ~~Resluicing statement.~~
1 Longitudinal section.
4 Plans

×separately sent Per Packet Post

Hay H

Sir,

I have the honor to forward an estimate for resluicing the Thadapally channel, miles 32-37 and its branch the Annapalayam channel.

2 The dimensions of the pipes have been fixed with reference to Professional Circular No. 45.C. dated 2nd December 1898 and the Executive Engineer states that screw gearing shutters are necessary owing to the depth of water and to prevent wastage in distribution.

3 The operator diagram prepared by the Assistant Engineer has already been sent to you.

† R. No. 43. C. I/99 was sent to Octy clerk on 17. 7. 99 under E. Is orders.
17. 7. 99

I have had a longitudinal section of the Thadapally channel prepared from the resluicing statement showing sill levels of the new sluices. I think the sills in many cases have been placed too high, and the number of new sluices allowed is, I consider, in excess of requirements.

I have the honor to be
Sir,
Your most obedient servant
Supg Engineer IV. Circle

2 Estimate
2 Report
2 Data sheet
1 Resluicing statement
1 Longitudinal section

AP
12.7.99

1898.

PUBLIC WORKS DEPARTMENT.

IRRIGATION BRANCH.

Recd. } 1898.
Regd. }

Enclosures
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Professional Circular, No. 45 C., 2nd December 1898.

DECEMBER.

Discharge of Water through Pipe-sluices

Issuing certain instructions in regard to the calculation of the —.

PUBLIC WORKS DEPARTMENT.

IRRIGATION BRANCH.

PROFESSIONAL CIRCULAR, No. 45 C.

Discharge of water through pipe-sluices.

From the estimates for pipe-sluices received in this office it would appear that many officers overlook the effect of the length of the pipe on the discharge and allow a uniform co-efficient for pipes of all diameters and lengths.

The following calculation is based on section 70 of Mr. Unwin's article on hydromechanics in the Encyclopædia Brittanica :—

Let h = difference of level of water in front and rear of sluice.
v = velocity.
l = length of pipe in feet.
d = diameter of pipe in feet.

The work done is expended in three ways :—

(1) The head $\frac{v^2}{2g}$ is employed in giving energy of motion to the water.

(2) A portion of head which experience shows may be expressed in the form $C_o \frac{v^2}{2g}$ is employed in overcoming the resistance at the entrance of the pipe.

(3) The head expended in overcoming the surface friction of the pipe is $C \frac{4l}{d} \frac{v^2}{2g}$. Hence $h = \left(1 + C_o + C\frac{4l}{d}\right)\frac{v^2}{2g}$ or $v = 8{\cdot}025\sqrt{\frac{hd}{(1+C_o)\,d + 4cl}}$. If the pipe is bell-mouthed C_o is about $= {\cdot}08$. If the entrance to the pipe is cylindrical $C_o = {\cdot}505$. Hence $1 + C_o = 1{\cdot}08$ to $1{\cdot}505$. The higher value need only be considered. The equation for h may be put in the form $h = \frac{4c}{d}\left\{\frac{(1+C_o)\,d}{4c} + l\right\}\frac{v^2}{2g}$, from which it is clear that the head expended at the mouth-piece is equivalent to that of a length $\frac{(1+C_o)\,d}{4c}$ of the pipe. Putting $1 + C_o = 1{\cdot}5$ and $C = {\cdot}01$ which is about the average value for slightly incrusted iron pipes, the length of pipe equivalent to the mouth-piece is $37{\cdot}6d$ nearly. This may be added to the actual length of pipe to allow for mouth-piece resistance in approximate calculations and the equation then becomes—

$$h = \frac{{\cdot}04}{d}\left\{37{\cdot}6d + l\right\}\frac{v^2}{2g} \text{ or if } h \text{ is the known quantity}$$

$$v = \sqrt{2gh}\sqrt{\frac{d}{{\cdot}04\,(37{\cdot}6d + l)}}. \text{ For } d \text{ in inches this becomes}$$

$$v = \sqrt{2gh}\sqrt{\frac{d}{{\cdot}48\,(3{\cdot}13\,d + l)}} = \sqrt{2gh} \times C,$$

~~when~~ where C is the tabular number in the following table which has been worked out by the undersigned for iron-pipe sluices of ordinary pattern :—

Lengths in feet.	Diameter in inches.							
	4	6	8	10	12	14	16	18
10	·60	·66	·69	·71	·72	·74	·74	·75
20	·50	·57	·61	·64	·66	·68	·69	·70
30	·44	·51	·55	·58	·61	·63	·65	·66
40	·40	·46	·51	·54	·57	·59	·60	·62
50	·36	·43	·47	·50	·53	·56	·58	·59
60	..	·40	·44	·48	·50	·53	·55	·57
70	..	..	·42	·45	·48	·51	·53	·55
80	..	..	..	·43	·46	·49	·51	·52
90	..	..	..	..	·44	·47	·49	·51
100	..	..	..	..	..	·45	·47	·49

2nd December 1898.

(Signed) W. HUGHES,
Chief Engineer for Irrigation.

To all Superintending Engineers.
,, the Chief Engineer, Public Works Department.
,, the Examiner, Public Works Accounts.
,, the Superintendent of Works, Lighthouse Division.
,, the Principal, College of Engineering.
Copies to all Executive Engineers of Divisions.

Exd. Shaik Karim.

10 P