M.R.O. 1—77,005—8-6-37.

(1) Number of pages 30

(2) Date of repair 14-4-44

(3) Initials of the Referencer

MADRAS RECORD OFFICE.

Government of Madras.

[illegible] DEPARTMENT.

G.O. No. 2362 Press Mis.

231-53/1-3744

Dated 22-4-44 18

Not to be folded or roughly handled

Read the following papers :—

No. 531. Read the following letter from the Superintending Engineer, 2nd Division, to the Chief Engineer for Irrigation, dated Bezwarah, 12th August 1870, No. 58-A.

One Survey.
One Detailed and Abstract Estimate, Rupees 1,13,530.

I HAVE the honour to forward survey, etc., of the Main Canal at Bezwarah prepared agreeably to your instructions, No. 93, of 22nd April 1870.

2. I request, however, that the point as to height of retaining wall may be referred to Government. Every local officer of the department considers that I am right in making it only 6 feet high.

3. It is not a question of wetting passengers' feet, but of wetting or even moving cotton bales out of a boat on to the wharf when the lowest step of the latter is only 6 inches below the roof of the boat and the gunwale is 2½ feet below it.

4. To use gang boards under these circumstances the boats must lie 7 or 8 feet from the wharf occupying valuable space in a rapid streamway, the boards being inclined at a slope of 3 to 1.

5. If the bottom step be level with the gunwale of a boat, when the water in the canal is at its lowest, gang boards can be used very nearly level at every rise of the water, and goods can be easily moved from the covered boats which now convey the larger portion of the traffic.

6. I would observe that the canal is perfectly navigable and very largely used when there is 5 feet of water in it; there is rarely more than 3½ feet on the lower sill of any of the locks.

7. A Government boat carrying materials occasionally uses the old Poollair between Pamuru and Kowtaram or Vadaly, but the fall is so great that it can scarcely be called navigable; and as the Main Canal bifurcates at 1 mile distance from the head-sluice into the Ellore and Masulipatam Channels, we have not been in the habit of calling them "branches."

No. 531-A. *Note by the Acting Chief Engineer for Irrigation.*

IN G. O. of the 24th October 1866, No. 3,395, an estimate, Rupees 20,080, was sanctioned for widening the Main Canal from the Kistna, on the Bezwarah or left bank of the river, from 25 to 40 yards. In November 1868 the Superintending Engineer submitted an estimate, amounting to Rupees 44,130, in supersession of that sanctioned in 1866, and the revised estimate provided for making the bottom width of the canal 60 yards or 180 feet. Colonel Anderson in reply requested that certain alterations of the arrangements might be made and that the estimate might be made to include the work necessary for giving an ultimate bottom width of 200 feet to the canal. Some further correspondence* took place, and in December 1869 estimates, amounting to Rupees 80,800, were sent in to this

Letter No. 121, 19th November 1868.

No. 138, 21st January 1869.

*From Superintending Engineer, No. 154, 18th February 1869.
To do. do., No. 155, 5th March 1869.

office accompanied by a survey and sections showing the arrangements intended. Some of the details of these arrangements were considered, for the reasons given in my memorandum* of the 23rd February last, No. 40, to require modification, and the several alterations which appeared to be required were mentioned. The present Superintending Engineer of the division concurred in the propriety of all the modifications suggested, with the exception of one which raised the height of the quay wall on the north side of the canal from 5 to 8½ feet, and after some correspondence it will be seen that Colonel Moberly adheres to the opinion that the top of this wall should be 5 or at most 6 feet above the bed of the canal. A minor point of objection on that Officer's part was the provision of a 4-feet berm or platform at the top of the wall, and I concur with him that it will be advisable to omit this, the width of the tread of the steps being at the same time increased from 1 foot to 18 inches.

* Annexed.

From Superintending Engineer extra No. 1 of 26th March 1870.
To do. do. No. 79, of 5th April 1870.
From do. do. No. 5, of 11th ,, ,,
To do. do. No. 93, of 22nd ,, ,,

2. The Superintending Engineer has now transmitted a revised estimate for carrying out the widening of the canal with the works connected therewith, which amounts to Rupees 1,13,530. The principal items are as follow:—

	Rs.	Rs.
Earthworks, north side	26,761	
Quay and revetments	28,948	
Sundries, etc.	2,776	
		58,485
Compensation for houses	.....	4,500
Road from Anicut Bridge to Masulipatam road	.....	1,305
Road from Ellore Canal Bridge to join Masulipatam and Ellore roads through Ryves' Bridge...	.....	1,855
Masonry wall and revetment connecting Ellore and Ryves' Bridges	.....	3,385
Earthworks, south side	17,315	
Revetments and turfing	24,623	
Sundries	2,062	
		44,000
Total...	.....	1,13,530

3. The estimate amounts to Rupees 113½ the yard run, and this is no doubt a large sum, but in revising the design the actual requirements of the circumstances of the canal on the south side have been provided for as economically as appeared practicable, while on the north side it was requisite to provide as much space as possible for the convenience of canal traffic, and at the same time to make the most of the space available and avoid too great interference with the town buildings which there are, at present, but little removed from the edge of the

Proceedings of the Madras Government, Public Works Department, 30th September 1870.

canal. It appeared to me the best and certainly the cheapest plan to construct the works, in the first instance, in a substantial manner, and as far as I am able to form an opinion the difference of Rupees 33,000 between the estimates of December 1869 and July 1870 will be fully compensated for.

4. With regard to the proper height for the wharf wall which, in the revised transverse section on the survey, is shown as 8½ feet above bed, and which Colonel Moberly thinks should not exceed 6 feet in height, I can only judge from the information which has been furnished to me by the Superintending Engineer, and as already pointed out by me to that Officer, this is insufficient to determine the exact height which should be allowed. It is a matter perfectly capable of determination from the registers, and all that is necessary is to show the average depth of water in each month that the canal is usually navigable, omitting those periods during which, either from the small depth of water or from the closure of the canal for clearances, navigation is necessarily suspended. The fractional register transmitted to this office appears to me to support the view that 8½ feet is not an excessive height for the wall, because a smaller height would be less convenient whenever the depth of water is more than 7½ feet. From August to December 1869—153 days—it was deeper than this except on 41 days, and it may be considered that whenever the water is at or above the 6 feet level, at which height the wall would be 18 inches above the gunwale of the boats, there would be practically no inconvenience, and out of the 41 days it was below that level for only 22 days. It is perfectly open to the Superintending Engineer to show by an examination of the registers for several years not only that 8½ feet is too great a height, but what height will be the most convenient, and I shall be quite ready to adopt whatever alteration the records show to be required. In the meantime it does not appear to me advisable that either the 8½ feet or any other height should be definitively determined upon. Any alteration that may be found necessary on further information being afforded will not affect the estimate, and I beg, therefore, to recommend its approval.

Memorandum No. 93, paragraph 3.

With letter No. 5 of the 11th April 1870.

5. The work under the original estimate, Rupees 20,080, is being carried out from Loan funds, but, before this revised estimate can be submitted to the Government of India, it will be necessary, I think, to show what the probable total expenditure on the Eastern Section of the Kistna Delta will be, and the anticipated results therefrom. This information should be given for each principal work, and should be divided into—

Firstly,—Expenditure already incurred including share of cost of anicut.

Secondly,—Further expenditure required { on sanctioned estimates. / on estimates yet to be submitted.

Thirdly,—The average revenue and acreage irrigated prior to the construction of the anicut and the channels connected therewith, the present acreage and revenue, and the ultimate acreage and revenue.

6. On the 30th June last the balance of the original estimate remaining unexpended amounted to Rupees 5,467, and, as this sum is within the allotment for the year, the Superintending Engineer should, I think, be authorized to proceed with such of the works as can be gone on with at this time of the year.

7. I have never had before me the whole scheme of irrigation of the Eastern Delta of the Kistna, and I do not exactly know what the depth and fall of the Ellore, Ryves', and Masulipatam Canals are. The late Colonel Winscom, when Superintending Engineer, appears to have intended the Main Canal to have a bottom width of 180 feet and a surface fall of 1 foot. Colonel Anderson thought an ultimate bottom width of 200 feet would be better, a reduction of velocity being no doubt one object to be obtained by this increase, and the carrying of a full supply with a smaller depth being another desirable result. 270,000 acres are to be irrigated under this canal, and 4,050 feet a second will therefore be the proper average discharge during the height of the season of cultivation; 8 feet depth of water at the head with a surface fall in the 1,000 yards of a little under 10 inches will give this discharge. The sill of the head-sluice being at 37·5 and the crest of the anicut at 43, it follows that the full supply in the channel will require a depth of 2½ feet on the crest of the anicut. This is available during the freshes, and as these subside a temporary dam of rough stone is formed on the crest to head up the water.

8. Colonel Moberly shows a maximum depth in the canal of 13 feet. This great depth may have been requisite with the extremely disproportionate size of the Main Canal before it was widened, but the maximum discharge need not exceed by more than 50 per cent. the average full supply when the canal is completed, and a depth of 10 feet will suffice for this. The height of the revetment on the right or south bank of the canal may therefore be reduced 3 feet, and this will effect a diminution of the cost; but I do not propose to alter the estimate, as the work will extend over a long period, and there are always difficulties in putting in the foundations of masonry and revetments in canals which are in use for the greater part of the year.

OOTACAMUND,
12*th September* 1870.

(Signed) J. MULLINS, Major, R. E.,
Acting Chief Engineer for Irrigation.

No. 532. ORDER THEREON, 30th September 1870, No. 2,362.

IRRIGATION, No. 30.

THE Government, on the recommendation of the Acting Chief Engineer for Irrigation, approve of the revised estimate, amounting to Rupees 1,13,530, for making the Main Canal on the Bezwarah side of the Kistna of the full width required for the ultimate area to be irrigated, and for providing a quay for the accommodation of the canal traffic.

2. The estimate will be submitted to the Government of India, so soon as the information, referred to in paragraph 5 of the Note by the Acting Chief Engineer for Irrigation, is transmitted by the Superintending Engineer; and in the mean-

No 358 A

Proceedings of the Madras Government, Public Works Department,
30th September 1870.

time Colonel Moberly is authorized to go on with such of the work, as can be proceeded with at this time of the year, out of the funds at his disposal from the original estimate and allotment of the current year.

(True Extract.)

Colonel, R.E.,
Secretary to Government.

To the Acting Chief Engineer for Irrigation.
,, Superintending Engineer, 2nd Division.
,, Revenue Department.
,, Controller of Public Works Accounts.

No 58 A

Supt Irrigation Office D
Bazouroh
12th August 1870.

From Colonel F. J. Moberly RE
Superintending Engineer 2nd D.

To The Chief Engineer
for Irrigation

Enclosures
1 Survey
1 detailed
Abstract
Estimate
Rs 113,530

Sir I have the honor to forward Survey &c
of the Main Canal at Bazouroh prepared agree-
ably to your instructions - No 93 of 22nd April 70

2 I request however that the point as to
height of retaining wall may be referred to
Government - Every local Officer of the Depart
considers that I am right in making it only 6 ft
high.

3 It is not a question of wetting passengers'
feet but of wetting or even moving cotton bale on
of a boat on to the wharf when the lowest step
of the latter is only 6 inches below the roof of the
boat and the gunwale is 2½ ft below it.

4 To use gang boards under these circumstances
the boats must lie 7 or 8 ft from the wharf -
occupying valuable space in a rapid stream way,
the boards being inclined at a slope of 3 to 1.

5 If the bottom step be level with the gun-
wale of a boat when the water in the Canal is at
its lowest gang boards can be used very nearly
level at every rise of the water and 6 or 8 can be

be easily moved from the Covered boats which now convey the larger portion of the traffic

6 I would observe that the Canal is perfectly navigable and very largely used when there is 5 ft. of water in it- there is rarely more than 3½ ft. on the Lower Sill of any of the locks.

7. A Government boat carrying materials occasionally uses the old Poollair between Pamurru & Kowtaram or Vadaly but the fall is so great that it can scarcely be called navigable, and as the main Canal bifurcates at 1 Mile distance from the Head Sluices into the Ellore & Masulipatam Channels we have not been in the habit of calling them "branches"-

I have the honor to be
Sir
Your most Obt. Servant

H. Hudson Colonel RE
Superintending Engineer 2d Dn

From
The Superintending
Engineer 2nd Dn
To The Chief Engineer
for Irrigation
Madras.

Dated 12th August 1870
Received " 21st "
No 5-8 A

Resubmits Survey & detailed & abstract Estimate amounting Rupees 113530 for widening the Head of Main Canal at Begumbra from 60 to 200 ft bottom width, prefered agreeably to instructions in Chief Engineers Mg 3 of 22nd July 1870.

No 2631

Note by the Acting Chief Engineer for Irrigation.

Imp Sp. C. of the 24th October 1868. No 3395 on Estimate Rs 20,080 was sanctioned for widening the main Canal from the Kotra on the Berguah or left bank of the river, from 28 to 48 yards. In November 1868 the Superintending Engineer submitted an Estimate amounting to Rupees 44,130 in supersession of that sanctioned in 1866, and the revised Estimate provided for making the bottom width of the Canal 60 yards or 180 feet. Colonel Anderson in reply

letter No 121 Nov 1868.

138 - 21st January 1869

requested that certain alterations
of the arrangements might be
made and that the estimate
might be made to include the
work necessary for giving an
ultimate bottom width of 200 feet
to the Canal - Some further
correspondence took place and
in December 1869 estimates
amounting to Rupees 80,800
were sent in to this Office as
accompanied by a survey and
sections showing the arrangements
intended: Some of the details
of these arrangements were
considered, for the reasons given
in my Memo of the 23rd Feby

" From: S. Engr
№ 154 - 18 Feby/69
To. do 155
5 Mar/69

x annexed

last № to require the
digestion, and the several alt-
erations which appeared to be
required were mentioned. The
present Superintending Engineer
of the Division entered in
the Inquiry of all the mo
dications suggested with the
exception of one which raised
the height of the quay wall on
the north side of the Canal
from 5 to 8½ feet, and after
some correspondence it will
be seen that Colonel Nevill
adhered to the opinion that the
top of this wall should be 5
or at most 6 feet above the
bed of the Canal - A minor
point of objection on that score
was the provision of a

From S Engr Ghia
№ 1 of 26 Mar/70
To do № 79
5 April 1870
From - do № 5
11th April 1870
To - do № 93
22nd do -

a 4 feet Berm or platform
at the top of the wall, and I
consider with him that it will
be advisable to omit this, the
width of the head of the steps
being at the same time increased
from 1 foot to 18 inches.

2. The Superintending Engineer has now Remitted a revised Estimate, for carrying out the widening of the Canal with the works connected therewith, which amounts to Rupees 113,530.

The principal items are as follows -

Earth

Earth works North side Rs.	26761.	
Quay and revetments	28,748	
Sundries Rs.	276	58,485
Conservancy for horses		4500
Road from Arcot Bridge to Masulipatam Road		1.305.
Road from Ellore Canal Bridge to join Masulipatam and Ellore roads through Ryves Bridge. Masonry wall and revetment connecting Ellore and Ryves Bridges		1855 3385
Earthworks South side	17.315	
Revetments and Masonry	24,623	
Sundries	2062	44,000
Total Rs.		113530.

3 The Estimate amounts to Rupees 113½ the grand sum and this is no doubt a large sum, but in revising the design

the actual requirements of the circumstances of the Canal on the South side have been founded for as economically as appeared practicable, while on the North side it was requisite to provide as much space as possible for the convenience of Canal traffic, and at the same time to make the most of the space available and avoid too great interference with the buildings which there are, at present, but little removed from the edge of the Canal. It appeared to me the best and certainly the cheapest plan to construct the works in the first instance in a substantial

manner, and as far as I am able to form an opinion the difference of £33,000 between the Estimates of Dec. 1869 and July 1870 will be fully compensated for.

With regard to the proper height for the retaining wall which, in the revised transverse section on the Survey, is shown as 8½ feet above Bal, and which Colonel Moberly thinks should not exceed 6 feet in height, I can only judge from the information which has been furnished to me by the superintending Engineer and, as already pointed out by me to that Office, this is insufficient to determine the

Memo No 93
Para 3

exact height which should be allowed. It is a matter for pretty capable of determination from the Registers and all that is necessary is to show the average depth of water in each month that the Canal is usually navigable, omitting those periods during which, either from the small depth of water, or from the closure of the Canal for alterations navigation is necessarily suspended. The fractional registers transmitted to this Office appear to me to support the proposal that 8½ feet is not an excessive height for the walls because a smaller height would be less

With letter No. 5 of the 11th April 1870.

of water is more than 7½ feet. From August to December 1864 - 153 days. It was deeper than this except on 41 days, and it may be considered that whenever the water is at or above the 6 feet level, at which height the wall would be 18 inches above the gunwale of the boats, there would practically no inconvenience and out of the 41 days, it was below that level for only 22 days. It is pretty open to the Superintending Engineer to show by examination of the registers for several years not only that 8½ feet is too great a height, but what height will be the most

411

quite ready to adopt whatever alteration the records show to be required: In the present stage it does not appear to me advisable that either the 8½ feet or any other height should be definitively determined upon. Any alteration that may be found necessary on further information being afforded, will not affect the Estimate, and I beg therefore to recommend its approval.

5 The work under the Original estimate Rs. 20,080, is being carried out from Loan Funds, but, before this revised Estimate can be submitted to the Govt of India, it will be necessary, I think, to show what the probable total expenditure on the Eastern Section of the Western Delta will be, and the antici-pated results therefrom. This information should be given for each principal work which should be divided into

1st Expenditure already incurred (including share of cost of Circuit.

2nd further expenditure required { On Sanctioned Estimates / On Estimates yet to be submitted.

3rdly the average Revenue and acreage irrigated prior to the construction of the Circuit and the channels connected therewith; the present acreage and revenue, and the ultimate acreage and revenue.

6 On the 30th June last the balance of the original Estimate remaining unexpended amounted to Rs. 5,467 and, as this sum is within the allotment

for the year the Superintending Engineer should, I think, be authorized to proceed ~~beyond~~ with such of the works as can be gone on with at this time of the year.

7 I have never had before me the whole scheme of irrigation of the Eastern Delta of the Kistna and do not exactly know what the depth and fall of the Ellore, Ryves, and Masulipatam Canals are. The late Colonel Kinneom, whom Superintending Engineer, appears to have intended the main Canal to have a bottom width of 180 feet and a surface fall of 1 foot. Colonel Anderson thought an ultimate bottom width of 200 feet would be better, a reduction of velocity being no doubt one object to be obtained by this increase, and the carrying of a full supply with a smaller depth being another desirable result. 270,000 acres are to be irrigated under this Canal, and 4,050 feet a second will therefore be the proper average discharge during the height of the season of cultivation. 8 feet depth of water at the head with a surface fall in the 1000 yards of a little under 10 inches will give this discharge. The sill of the head sluice being at 37.5 and the crest of the anicut at 43, it follows that the full

supply in the Channel will require a depth of 2½ feet on the crest of the Anicut. This is available during the freshes, and, as these subside, a temporary dam of rough stone is formed on the crest to head up the water -

8. Colonel Mobely shows a maximum depth in the Canal of 13 feet. This great depth may have been requisite with the extremely disproportionate size of the main Canal before it was widened, but the maximum discharge need not exceed by more than 50 per cent the average full supply when the Canal is completed, and a depth of 10 feet will suffice for this. The height of the revetment on the right or South bank of the Canal may therefore be reduced 3 feet, and this will effect a diminution of the cost; but I do not propose to alter the Estimate, as the work will extend over a long period, and there are always difficulties in putting in the foundations of masonry and revetments in Canals which are in use for the greater part of the year -

Colombo
Feby 1870

Colonel Hutchins Major R.E.
Acting Chief Engineer
for Irrigation

No 1870 Dispatch
Proceedings for September
No 3761.

From

Ag. Chief Engineer
for Irrigation

Dated 12th
Received 22nd } Septr 70.

Enclosures 2.

Note on the
revised estimate
for widening the
Main Canal on
the Bezoarah side
of the Kistna.

No 2362 - 30th Septr 70.

No 631 A

Irrign — Dpt. Septr 21 — 71

No 2362

Proceedings of the Madras Government.

Under date the 30th Septr 1870.

Read the following

From the Actg Chief Engineer
for Irrigation (Hrc enclosure No of 12th Septr 1870).

The Government, on the
recommendation of the Acting
Chief Engineer for Irrigation,
approve of the revised estimate
amounting to Rs 1.13.530.
for making the Drain
Canal on the Bezoarah side
of the Kistna of the full
width required for the
ultimate area to be irri-
-gated, and for providing
a quay for the accommoda-
-tion of the Canal Traffic.

2. The estimate will
be submitted to the Government

of India, so soon as the information referred to in Para 5 of the note by the Acting Chief Engineer for Irrigation, is transmitted by the Superintending Engineer; and in the meantime Col. Moberly is authorized to go on with such of the work as can be proceeded with at this time of the year, out of the funds at his disposal from the original estimate and allotment of the current year.

14/9/70

The letter + Survey Connected with this
has been dispd 14/3/71 with letter No
743 of 1871 to the Govt of India
Do + Recd with Govt No 1389-20 May/71
3 The Chief Engineer for
6 Irrigation
21 " Supdg Engr 2d Dn
2 " Rev: Dept
5 " Controller
Dispd 1/10/70.

No. 3761

Govt. of 1870 Madras.

PUBLIC WORKS.

To The Chief Engineer for Irrigation

Dated

Rec'd 3

G. O. 30 dated 23. 62

Nos. 631 & 632.

Main Canal. Plan revised

Estimate Rs. 1,13,530 for

Residency to Main Canal

Left Bank & Right Side of the

Kistna & for providing

a Ghaut for the accommo-

dation of the Canal

Estimate approved

&c.