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TAMIL NADU ARCHIVES

GOVERNMENT OF TAMIL NADU

Revenue DEPARTMENT

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GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

2nd August 1877, No. 212 L.

Irrigation.

Read the following papers:—

No. 4. Endorsement of the Chief Engineer for Irrigation, dated Fort St. George, 21st July 1877, No. 113 I.

From Colonel F. J. MODERLY, R.E., Superintending Engineer, Chingleput, to the Chief Engineer for Irrigation, dated St. Thomas' Mount, 16th July 1877, No. 1,405.

In reference to the concluding paragraph of my letter No. 1,287 of 6th instant,

10 Plans.

10 Estimates.

I have the honor to forward for sanction the enclosed plans and estimates, amounting to Rupees 5,028, for constructing

sluices for lifted water through the Cortilar embankment.

No. 101 L.

No. 4-A. Note by the Chief Engineer for Irrigation.

The Superintending Engineer, Chingleput, has transmitted revised estimates for the Cortilar embankments on both sides below or to the eastward of the trunk road from Madras to Nellore.

2. *Embankments not liable to be turned at upper end.*—The western or upper ends of the embankments as proposed are, the Superintending Engineer believes, not liable to be turned, and all river spill above this point returns to the river west of the intended terminus.

3. *Data.*—The data on which the embankments have been designed are not as complete as would have been desirable. They have been designed with reference to the flood of 1874, which was the highest of which anything is known, and the flood levels

* Seven miles seven chains below Nellore road by the river. Nellore road, the Vallur anicut* (above), and the Rhodiankuppam lock a little

south of the outfall of the river, or its entrance into the Eumore backwater. From these levels a flood surface fall has been deduced which probably does not err materially and for a short distance below the anicut is likely to be somewhat higher than the actual, for there was no doubt some fall at the anicut, but the level of the water below the weir was not recorded.

A few cross sections of the river have been taken, and of these four are above the anicut. The following particulars have been taken from these sections which however represent the greater part but not the whole of the waterway, as everywhere there must have been more or less spill.

	Width of River.	Area of Waterway.	Mean depth.
No. 1, Nellore road	1,587	17,078	11.11
" 2, 1 mile 75 chains below	1,436	19,785	13.77
" 3, 3 miles 49 chains	1,230	14,739	11.93
" 4, 4 " 321 "	601	8,565	14.27

No. 4 section is moreover oblique to the axis of the river, and the actual cross section of waterway is smaller than above shown.

4. There is much to indicate that a large part of the discharge leaves the bed proper of the river above or in the 5th mile and finds other outlets. The longitudinal sections for the embankments show this. From about the point marked A above on the axis of the river there is a valley or a depression running north-eastward, which acts as a line of discharge in high floods, and indeed injury to cultivation by floods appears to have been complained of. This depression is not shown on the longitudinal survey, but it was shown to the

undersigned on a survey for an irrigation channel from the Tamarapak anicut. In the 5th mile again there is a channel shown on the south side which no doubt carries a large body of water discharging it again into the Cortilar in the 9th mile. It is proposed in the estimates to close the upper end of this branch, but to leave the lower end open. As it receives much drainage on the right bank and some on the left it cannot be embanked and so retained as a part of the river waterway unless provision be, at the same time, made for admitting the drainage, and this would involve costly masonry works. The only feasible plan therefore seems to be to exclude it from the waterway in low freshets of the river and to make use of it in high freshets which could be managed by placing a weir at its head on the line of the embankment making the crest about 10 feet (probably 8 feet) above the deep bed of the river and about 300 feet long. This would reduce the discharge in that direction, so far as the high and prevent most of the damage which now occurs.

* Some cross sections will be necessary to determine what the discharge down the byewash should be.

5. The undersigned is decidedly of opinion that it would not be wise to attempt to form complete or continuous embankments on the alignment shown by the survey in the 5th, 6th and 7th miles. These embankments have however been influenced by the fact that a good deal of embanking has been done in former years, and it was desired to utilize these. Another reason may have been that there are several villages near the river margin, which of course would wish to have the embankments between them and the river, while a third reason is that the ground is in many cases somewhat higher than that of a distance from the river. These reasons however must give way to the paramount necessity of placing the flood banks where they are likely to be maintainable, otherwise they will fail when most needed.

6. The Superintending Engineer has mentioned verbally that the left embankment from near Soobareddy Kundriga, 6 miles by the river, down to the Vullur anicut, and for some distance below the latter is practically complete, and for the alignment above the anicut there is no objection beyond the somewhat too close proximity of the flood bank to the river. It follows then that the right embankment must be aligned much further back than the old flood banks.

7. It is not practicable to demonstrate what would be a suitable and proper distance between the embankments. To do this it would be necessary to know what the discharge is, what the mean velocity of the river is in high flood, and consequently what the area of waterway should be. Then on each section of the river it could be approximately shown where the embankments should be placed. The area of the drainage basin of the Cortilar above the Nellore road is about 1,515 square miles, and the maximum flood discharge may perhaps be assumed to be not more than 63,450 cubic feet a second. With an average depth of 12 feet of water, a hydraulic mean depth of 12 feet and a fall of 5 feet a mile, the width of waterway required would be 1,000 feet. It is considered that if the byewash in the 6th mile be retained probably 34 chains or 1,514 feet

The conditions give a mean velocity of a second, but the large quantity moved probably reduces the velocity to a second.

will be a suitable minimum width between the embankments above that point and 18 chains* thence to the bifurcation of the river in the 9th mile, and the byewash may obviate the necessity for lengthening the Vullur anicut which would, were the former closed, be unavoidable.

8. The abstract estimates as submitted by the Superintending Engineer do not distinguish between the right and left banks, but are divided into—

	Rs.
Repairs	13,985
Construction	15,916
Total	29,901

and they provide for earthworks only, the estimates for masonry works being not quite ready.

The embankments on the revised alignment which has been indicated on the survey in black chain lines will cost considerably more for earthworks.

The cross section of the banks moreover is shown on the sections as 3 feet top width, 3 feet above flood level, and 1½ to 1 slopes. The top width is small for river embankments, and in places the soil may not flatter slopes. Allowing 4½ feet top width, the earthworks will probably amount to nearly Rupees 36,000, and a 300 feet weir at the head of the byewash will cost about Rupees 15,000. Of minor masonry works 20 sluices appear to be needed in the right and 14 in the left embankment, and may come to Rupees 4,080, so the approximate general estimate may be taken as Rupees 60,000.

9. The papers transmitted by the Superintending Engineer are silent altogether as to the extent of country, the number of tanks, the area of irrigated and unirrigated land; the wet and dry revenue which will be affected by the embankments. On the ground that if it be determined to carry them out at all they will be wanted very shortly for the employment of famine labor, these omissions have not been allowed to delay the submission of the papers to Government, and it may be added that there is no doubt that the embankments, if successful, will be of much greater value than the permanent charge of Rupees 3,000 annually for interest and some Rupees 1,500 or 1,600 for repairs.

10. The upper end of the right flood bank must be taken to the ground a little above flood level shown on the longitudinal section some 41 chains west of the end of the bank on the longitudinal section, which there terminates enclaire, and on ground below flood level. Both banks must be commenced at the western end and carried on thence to the eastwards.

11. With regard to the embanking below the anicut the right bank is intended to terminate a little below 8 miles, and there is a flood bank of irregular level at present. The byewash comes in again a short distance further down, and no embanking across this is likely to be feasible.

The alignment of the left bank is very bad in some places, and the worse parts should be improved as shown in chain line. This embankment may prevent sweep, but if the flood levels are reduced by approximately correct backwater will extend behind the bank as far north as Gondampolliem.

The levels of the island show that generally it is some feet below flood level. The proper alignment has been marked, but the banks must not be carried round the lower (south) end of the island, but should terminate about half a mile above the southern point of the alignment on the west side and at a corresponding point on the east side. Such banks will not interfere with the drainage of the island, will prevent sweep, and will reduce the flood level to 5 feet. Much of the ground will continue to be inundated, but this will be disadvantage. The southern ends of the banks generally should be sloped down to and level at about 1 in 50.

12. The estimates submitted by the Superintending Engineer contain no provision for land compensation. However much it may be desired to hasten the work being made available for famine relief labor, it appears to be necessary that the land required should be marked out and the compensation settled before work is commenced. The case of the Chemburabankum tank is a warning against determining on the execution of any public work until land compensation has been settled.

13. It is desirable that the Superintending Engineer should make further investigations to determine whether it will be desirable to provide for the discharge of any part of the flood waters in a north-easterly direction from about three miles below the Nellore road.

14. The above remarks will show that there are some details of the arrangements which cannot be finally settled at present or probably until the first considerable flood after the embankments have been formed shall have demonstrated more exactly what the conditions are. The Superintending Engineer says, in the last paragraph of his brief report, "The section of the Corililar at Vallur is much smaller than at Tamarak, and it is still less where the Tirivatur road crosses, but spreads (i.e., the river spreads) over a great area of country; it will be interesting to watch the effect of the embankments hereafter." The general character of the effect of running banks close alongside a congested too narrow river which spreads in floods over a great area of country it would not be difficult to predict, and the revision of Colonel Moberly's proposals has had for its object the substitution of arrangements which may probably admit of the flood waters being confined between the embankments or distributed in such a manner as to reduce, if not obviate, altogether the damage or inconvenience which, while unregulated, they occasion.

Fort St. George,
12th July 1877.

(Signed) JOHN MULLINS, Colonel, R.E.,
Chief Engineer for Irrigation.

To the Joint Secretary to Government, Public Works Department, Irrigation Branch.

SUBMITTED to Government in continuation of the Note No. 101 I of the 12th instant.

2. The Superintending Engineer has designed small sluices for the Corililar embankments to enable water, raised from the river bed, to be passed under the flood banks.

The designs have been prepared for every 6 inches of height of embankment and the numbers of each kind required are—

2 for 4½ feet	...	...	...	...	...	Rupces	52	104
10 " 5 "	...	...	...	...	...	"	57	570
12 " 5½ "	...	...	...	...	...	"	75	900
5 " 6 "	...	...	...	...	...	"	38	450
3 " 6½ "	...	...	...	...	...	"	102	506
9 " 7 "	...	...	...	...	...	"	110	980
2 " 7½ "	...	...	...	...	...	"	116	450
4 " 8 "	...	...	...	...	...	"	122	488
2 " 8½ "	...	...	...	...	...	"	125	250
5 " 9 "	...	...	...	...	...	"	140	700
54								5,026

The number appears to be less than that named in p.

3. It will be better to place the axis of the sluices, and the wings for flood-water may be

than that shown on the survey, but the average of 8 of the note above referred to.

ings at a slight splay instead of at right angles, a foot in depth of rough stone between the either direction accidentally or otherwise.

The arches of the smaller sluices are thicker than is necessary. Two rings of brick on edge will suffice up to 5½ feet of embankment, and three rings for the rest of the sluices. The bars for the swing shutters must not be secured to the arch work, but should be carried one foot into the wings and should be held by oblique bolts* secured in the abutments. The lower edge of the bar may be flush with soffit of arch.

* 2½ feet long.

The culverts will have to be lengthened 18 inches to allow of the enlargement of the top width of the banks to 4½ feet, and some of them beyond this to admit of two to one slopes altogether, however the cost is not likely to be 5 per cent. in excess of the estimate.

(Signed) JOHN MULLINS, Colonel, R.E.,
Chief Engineer for Irrigation.

P.S.—It will probably be advisable to fit a good many of the sluices with sliding instead of swing shutters, so as to allow of water being admitted to the fields by flow when the river is in fresh. The vents should then be contracted at the shutter, so that the velocity of the water at the rear end may be moderate.

(Initialled) J. M.

No. 5. ORDER THEREON, 2nd August 1877, No. 212 I.

The scheme for embanking the Corililar below the Nellore road has not been submitted in that complete form which is, in the case of works of this class, desirable. It is clearly requisite that proposals for embanking rivers should be supported by information as to the area of cultivated land wet and dry to be protected by the flood banks, and as to the loss of revenue, damage to roads, tanks and private property, which the absence of embankments has in recent years occasioned.

2. The arrangements and estimates also as submitted by the Superintending Engineer were inadequate and incomplete, although the Chief Engineer for Irrigation revised them so far as the information available would allow, and has thereby raised the estimate from Rupees 34,929 to an approximate sum of Rupees 60,000; there are points of importance yet to be settled, which may add considerably to the total, and for the land compensation no provision whatever has yet been made.

3. Looking to the urgent need however which exists for providing work for distressed laborers in the Chingleput District, His Grace the Governor in Council sanctions immediate steps being taken to ascertain the compensation for the land required.

4. The Superintending Engineer will therefore cause these embankments to be marked out according to the revised alignments recommended by the Chief Engineer and shown on the survey, as also the boundary lines of the land required for the flood banks, and for the pits whence earth is to be taken, and the Collector will be instructed through the Revenue Department to arrange for the immediate ascertainment of the amount of compensation which will be required, and to report the acreage and the amount of this estimate as quickly as possible. This estimate or determination of price should be made regularly from the Nellore road downwards, so that the embankment work when ordered to be taken up may be proceeded with continuously from that point.

5. Colonel F. J. Moberly will also lose no time in obtaining data for the settlement of the details of the weir at the head of the bye-wash on the right bank, and for determining what quantity of water if any should be allowed to flow north-eastwards from the 3rd mile on the left bank, and what works will in that case be necessary.

6. The top width of the flood banks will be $4\frac{1}{2}$ feet and the slopes should not be as steep as $1\frac{1}{2}$ to 1, except where the nature of the soil is such as to ensure their standing well at so steep a slope.

(True Extract.)

(Signed) JOHN MULLINS, Colonel, R.E.,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

To the Superintending Engineer, Chingleput.
" Collector of Chingleput.
" Examiner of Public Works Accounts.
" Chief Engineer for Irrigation.
" Revenue Department.
" Board of Revenue.

Wrd. E. C. Shunkar.
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PUBLIC WORKS

TO THE SUPERINTENDING ENGINEER
OF THE PUBLIC WORKS

Date August 14/77

13/8/77

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Communicated to the
Collector of Chongchuan
who is to take immediate
steps to have the amount
payable as compensation
for the land required for
the new bank
estimated by the
the extent of land
to be paid for it.

13/8/77

13/8/77

13/8/77

To the Collector of Chongchuan
19/10/77

13/8/77
13/8/77