

(1) Number of pages 11
(2) Date of repair 12-1-17
(3) Initials of the Referencer

MADRAS RECORD OFFICE.

Government of Madras.

Public Works DEPARTMENT.

G.O. No.	1364	Press
319-240		Mis.
Dated	17-5-	1871

Not to be folded or roughly handled

No. 319. Read the following letter from the Consulting Engineer for Irrigation and Canal Company, to the Secretary to Government, Public Works Department, dated Madras, 24th April 1871, No. 10 :—

I HAVE the honour to submit the correspondence noted in the margin, relating to the distribution works in the 2nd Irrigation Range under the 9th Section of the Main Canal.

From Agent, No. 509, 6th December 1870.
To " " 276, 17th
From " " 139, 28th March 1871.
14 Plans.
4 Estimates.

2. The schemes as originally designed were first received with the Agent's letter No. 509, 6th December 1870, but as it was found that existing interests were injuriously affected by some of the arrangements proposed, and that the consent of the owners of tanks and channels had not been obtained, I felt it necessary to return the projects for re-consideration—my No. 276, 17th December 1870.

3. The schemes have now in a great measure been re-arranged, and, as recast, appear free from the objections noticed above. They are explained in detail in the Deputy Chief Engineer's report which accompanies the Agent's last named letter, No. 139, 28th March 1871, in the 10th paragraph of which he remarks that no existing irrigation or drainage is injuriously interfered with further than that, in some cases, channels pass through wet cultivation, which however was unavoidable, and the Revenue authorities will no doubt see that the ryots receive equitable compensation.

4. Mr. Gordon has so fully described the course taken by each channel and the site of each masonry work, it only remains for me briefly to notice the chief features of the schemes.

The irrigation consists of two plots, one on the right side of the Main Canal, called the Yaitoor district, and the other on the left side, called the Maidkoor district; the former extending from the 168th to the 177th mile, and the latter from the 168th to the 175th mile.

5. For the Yaitoor district the supply is taken off the Main Canal by a sluice of ten vents in the 169th mile, where one long channel, called the Yaitoor primary, carries water for 10,230 acres, the most of which is distributed direct from the channel, only 4,221 cubic yards an hour being parted with for the irrigation of 1,206 acres under a supplementary channel called Mootaloorpad. These channels are shown on Drawing No. 565 A, and their further extension on No. 2, 28th November 1870.

6. For the Maidkoor district the supply is taken off the Main Canal by a sluice of six vents in the 169th mile. The channels are designated Maidkoor primary and Maidkoor secondary, and their course is shown on Drawing No. 564 A. The area to be eventually irrigated is 6,500 acres, exclusive of 350 acres to be supplied from a branch of the Yaitoor works, on the opposite side of the Main Canal, by water carried under it in a culvert. Of the 6,500 acres it is proposed to construct channels for 4,000 only at present, though the head works and primary channels are designed and will be constructed to carry water for the larger area. On this point the Deputy Chief Engineer observes that there is more land commanded than there

is water available for, and that it is advisable to defer the construction of some of the channels until it is known where the demand for water will be, and with this object it is proposed that the estimated cost of the minor channels for 2,500 acres, namely, Rupees 2,925, of the amount for which sanction is now asked, shall for the present be retained unexpended.

ESTIMATE.

<i>Maidkooor</i> ...	4,000 Acres.	
Sluices in Main Canal ...	Rs. 900	
Channels, earthwork ...	5,530	
Do. masonry works ...	3,470	
Subsidiary channels at 6 As. per acre ...	1,500	
Channels and masonry works for an additional 2,500 acres hereafter ...	2,925	
	14,325	

<i>Yaitoor</i> ...	10,230 Acres.	
Sluices in Main Canal ...	Rs. 1,400	
Channels, earthwork ...	10,754	
Do. masonry works ...	2,810	
Subsidiary channels, at 6 As. per acre ...	3,836	
	18,800	

Total Rs... 33,125

for the irrigation of 16,740 acres, giving about Rupees 2 an acre, which is a fair average.

7. Looking to the comparatively large blocks of land to be watered from each length of channel, I distrusted the allowance of 6 Annas an acre, and requested the Chief Engineer's re-consideration. He replies that experience only can decide as to the sufficiency of the rate; but he is of opinion that 6 Annas an acre will enable the Company to do all that is required for the delivery of the water to each field commanded.

8. The masonry works, the sites of which are shown on the surveys, are:—

<i>For Yaitoor District.</i>	<i>Maidkooor District.</i>
1 Head Sluice.	1 Head Sluice.
1 Aqueduct.	2 Irrigation Sluices.
1 Sluice	2 Aqueducts.
1 1st class Bridge.	3 1st class Bridges.
4 2nd „ „	2 Timber Troughs.
1 Masonry Channel.	1 Culvert.
2 Drainage Crossings.	2 2nd class Bridges.
60 Overfalls.	1 Drainage Crossing.
6 Paved Fords. } Sites undetermined.	21 Overfalls.
	6 Paved Fords. } Sites undetermined.

9. The rates are:—

Excavation ...	10 Cubic yards per rupee.
Rubble masonry ...	4 Rupees per cubic yard.
Concrete ...	3 „ „ „
Puddle ...	4 to 6 Annas „ „
Concrete floor ...	Rs. 2-8-0 „ „
Archwork ...	„ 6 „ „
Teakwood ...	„ 6 „ cubic foot.
Stone pitching ...	„ 1 to 2 „ „
Rubble apron ...	„ 1 „ „

which, excepting concrete which is high and teakwood which is enormous, are fair.

10. I recommend the estimates for sanction. The previous sanction for the distribution works of the 9th Section, as given in Government Order No. 2,786, of the 10th September 1867, is Rupees 15,125 for sluices, of which Rupees 3,600 were allotted in the estimate for the 1st Range of the distribution works of the 9th Section, forwarded with my letter No. 1 of the 4th instant; the remainder, Rupees 11,525, should therefore be deducted from the total amount of the estimate now submitted, the amount now requiring sanction is Rupees 21,600, on account of which an advance of Rupees 2,298 was made in Government Order No. 783, 15th March 1871.

From the Agent and Manager of the Madras Irrigation and Canal Company, to the Consulting Engineer for the Madras Irrigation and Canal Company, dated Madras, 6th December 1870, No. 509.

I HAVE the honour to forward, for sanction, plans and estimates for distribution works in the 9th Section, with copy of the Chief Engineer's No. 1,649-A, dated 28th November 1870, and Mr.

Dated 24th November 1870.

Gordon's letter, in original, to the address of Mr. Latham.

2. The drawings which accompany this scheme are enumerated in the list appended to Mr. Gordon's letter, but the village Land Plans, numbered 1 to 3 and 4 to 14, have not come to hand. They have been called for and shall be forwarded as soon as received.

3. The estimates in connection with this work are:—

- 1 Abstract Estimate of earthwork and masonry.
- 1 Tabular Statement of channels on east side of the canal.
- 1 Do. do. do. west do.

From the Chief Engineer, to the Agent and Manager of the Madras Irrigation and Canal Company, dated Camp at Adamapully, 28th November 1870.

Dhoor Distribution.

I HAVE the honour to forward the documents marginally noted, and to request the sanction of Government to an expenditure of Rupees 33,122-4-0 thereon.

2. The works consist of those necessary for distributing water to 16,310 acres from the pond above the first lock, and might appropriately be called the second range of distribution for Dhoor division. No distribution takes place from below the first lock.

3. The sluices and size of channels for irrigating 8,690 acres from the canal between Rajoli and the first lock have been selected and approved by me, but the surveys are not quite complete, but will, I hope, be sent in before Christmas.

*Proceedings of the Madras Government, Public Works Department,
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4. The size of the channels has not been worked out strictly according to rule, but this it is proposed to remedy in accordance with the Consulting Engineer's last letter on the subject.

5. In reference to the Nuttaloore and Nundipad tanks, I think it will be best for the Company to take over the former, which has nearly sunk into disuse owing, I presume, to the decay of its artificial supply channel. The bund is a sound one, and the tank is capable of being usefully employed for irrigating a second crop.

6. I do not see any need to interfere with the latter tank, to which the Company might guarantee a full supply yearly, without any expense or waste of water.

From G. GORDON, Esq., Deputy Chief Engineer, to the Chief Engineer of the Madras Irrigation and Canal Company, dated Cuddapah, 24th November 1870.

Dhoor Distribution Surveys.

Yaitoor and Maidkoo channels.

I HAVE the honour to forward plans and estimates for the distribution of 32,620 cubic yards of water which is taken off from the canal immediately above Lock No. 1, and which is intended to irrigate 16,310 acres, the estimate amounts to Rupees 33,182-4-0 or Rupees 2-0-5 per acre, after adding 6 Annas per acre for subsidiary channels. The cost of permanent staff and office expenses is not included in the estimate.

2. At the 169½ mile occurs the first lock in the division, and from this point the Main Canal falls rapidly by locks towards the Pennair. This distribution district now under report lies on this Pennair slope (east and west of the canal), and is the most important in this division, as it contains, as above stated, 16,310 acres, the full irrigation power of the division being 25,000 acres.

3. It is desirable to take off the great bulk of water from above the first lock, as the canal below has been made in level reaches, and any water taken off below would have to be passed through the lock sluices which is considered objectionable. The water is therefore taken off above the locks, and there is discharged on the west side water for 4,576 acres,* and on the east

* Out of 9,929 irrigated on west side of canal.

for 11,73½ acres. The district to the west of the canal has, for convenience, been named the Yaitoor district; that on the east Maidkoo district.

4. I.—*Yaitoor district (west of Main Canal).*—This contains 9,929 irrigable acres, and is bounded on the east by the Main Canal, on the west by the Koondair, on the south by the

General Plan No. 2.

Pennair, and on the north by the Peechapad vunkah; a large stream which the Main Canal crosses by an aqueduct of seven spans of 15 feet. From the off-take sluice the country falls in every direction, the sluice being, roughly speaking, at the apex of a half cone. The primary channel is carried straight down the slope for about 2 miles, when the country loses its conical shape, and forms a ridge between the Koondair river and the Yaitoor vunkah. The primary is then carried on this ridge till it falls into the Pennair after a course of 10 miles.

5. The Yaitoor vunkah is not a large stream, but has a very decided valley, and separates the land immediately touching the Main Canal from the primary ridge channel, so that it cannot be irrigated from the latter.

6. The primary has a very rapid fall, 45 feet in the first four miles and 32 in the remaining six, and as the land falls from it on both sides, subsidiary channels can be easily made to irrigate the whole of the land in the villages commanded, except the part above mentioned, adjoining the Main Canal. This consists of the villages of Mootaloorepad, Toodoomuldinna, and a part of Komaloore. It will be hereafter explained that water is brought from the Maidkoo side into the Yaitoor vunkah; a portion of this is picked up for the use of Mootaloorepad and Toodoomuldinna. It now remains to describe the channels with their method of supply.

7. The fall of the country is so rapid that it would be very expensive to bring the full quantity of water required for the Primary down from the beginning; it is proposed, therefore, to take

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off at the off-take sluice only sufficient for the 4,576 acres in the first four miles; the remainder for 4,447 acres, together with that for 1,206 acres in Mootaloorepad and Toodoomuldinna, is taken out at the Maidkoo primary (on the east side of the canal) and thrown into the Bookyapully vunkah, where it is picked up by an anicut and brought under the Main Canal through the culvert at 171st mile into the Yaitoor vunkah. Here water for 1,206 acres is carried off by the *Mootaloorepad channel*, and the rest brought by the *Goodaloore channel* into the primary ridge channel. In this way a fall of 45 feet is effected at a small expense, but with the inconvenience of interfering with the Mittatoore tank. This latter is a small affair, formed by a bund thrown across the Yaitoor vunkah, and irrigating 32½ acres. A channel for its supply from the Bookyapully vunkah has been made, and a drystone regulating calingulah placed at the end of channel; the calingulah has not been kept in repair, and the channel is breached in two or three places. It is proposed to

• Which serves also for the Maidkoo secondary channel. build a masonry anicut* across the vunkah, repair the channel at an expense of Rupees 500, and make use of it and the outfall channel already dug from the culvert to carry the water required for the Yaitoor channels.

8. It will be necessary for the Company to acquire the tank or arrange to supply it with sufficient water for its present irrigation. It belongs to several partners in Mittatoore.

9. The primary leaves the Main Canal at 168½ miles by an English sluice of four openings, which throws sufficient water for 4,576 acres, (11,440 cubic yards per hour,) into a channel 2½

Drawing No. 1.

feet wide at bed, 1½ feet deep, and falling 1:2600. The channel gradually decreases till it is 6 feet wide and 1 foot deep at three miles from its commencement; the inclination also gradually increases till it reaches 1:776. This part will irrigate, by subsidiary channels to be hereafter and gradually made, the villages of Bookyapully, Alludpully, Pedda and Chinna Goodaloore with the small part of Maidkoo lying on the west of Main Canal, and this will just use up the 11,440 cubic yards an hour admitted from the Main Canal (maximum discharge).

10. The masonry works on this length of about 4 miles (more exactly 22,900 feet) consist of—

Drawing No. 1.

" " 12.

" " 13.

" " 11.

1 English Sluice of four openings.

1 Masonry Overfall, 3 feet.

1 Bridge, first class, across Podatoore and Nundialumpett road with overfall 3 feet 10 inches.

1 Bridge in Pedda Goodaloore.

1 Road Crossing.

32 Overfalls of 6 inches.

11. The rest of the land to be irrigated from the primary is 4,447 acres, the water for which, as above stated, is dropped from the Maidkoo channel into the Bookyapully vunkah. The anicut from which it is dropped would have to be built in any case for the use of Maidkoo channel, so no expense is incurred by bringing the Yaitoor water from the Maidkoo side, beyond the necessary enlarging of the Maidkoo channel. After running for three-quarters of a mile in the Bookyapully vunkah, the water is picked up by an anicut of 60 feet crest, which anicut is also required for the purposes of the Maidkoo side.

Drawing No. 7.

12. As before stated, the water required is then taken off from the above anicut by an existing channel, and its regulation is effected by a sluice placed about half a mile down the channel* where good foundations occur, it then passes

Drawing No. 14.

* Or it may be joined with the anicut.

under the Main Canal by the culvert, already built at 171st mile, when a drop of 5½ feet is gained by the help of the breast wall of the culvert; it then follows the channel, which has by the time become the Yaitoor vunkah, to the boundary of Chinna Goodaloore, where an anicut with right

Drawing No. 10.

and left side sluices will be built. A supply sufficient for the Mittatoore tank will have to be passed over the anicut and the rest used for the Company's works. Water for the acres 1,206

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will be taken by the left sluice to Mootaloorpad, and its disposal will be hereafter described. Water for 4,447 acres will be carried by the right sluice into the Goodaloor channel, which joins the Yaitoor primary at about 4 miles from the beginning of the latter. The Goodaloor channel is 16 feet wide at bottom, 2 feet deep, and falls 1 : 3,000, and has one masonry overfall of 2½ feet. The masonry works on this portion of the work are :—

Drawing No. 14.	1 Sluice for 11,304 cubic yards.
" " 10.	1 Anicut 13 feet crest with side off-take sluices.
" " 12.	1 Overfall 2½ feet (similar to Yaitoor 3½ feet fall).

13. The Yaitoor primary thus re-enforced proceeds along the ridge in a channel 23 feet 8 inches wide at bottom, and 1½ feet with fall of 1 : 2600; these dimensions are gradually reduced to 6 feet 9 inches wide and 1 foot deep, and the inclination increased to 1 : 746; with these latter dimensions it reaches the Pennair near the village of Komaloor. The only masonry works on this length are 17 overfalls of 6 inches each and a road crossing. This channel would cross the waste channel of the Mittatoor tank, but it is intended to divert this as shown on the General Plan No. 2.

14. Reverting now to the water for 1,206 acres taken off at the off-take of Goodaloor channel, 906 of it is expended in Mootaloorpad and Toodoomuldiinna and the remainder thrown into the culvert at 173rd mile 75 chains, for the use of the part of Toodoomuldiinna lying on the east of Main Canal.

15. The summary of land irrigated is as follows :—	Acres.
Yaitoor primary 1st to 4th mile direct from Main Canal	4,576
Do. do. 5th to 10th supplied by Maidkoo channel by Goodaloor channel	4,447
Mootaloorpad and Toodoomuldiinna supplied from Maidkoo channel by Goodaloor channel	906
	Acres... 9,929
	2

or cubic yards per hour... 19,858

General Plan No. 1.

16. II.—Maidkoo District (east of Main Canal).—This contains 6,380 acres, and is

bounded on the west by the canal, on the east by the Nundipad vunkah to the main road and then by the Kazeepett vunkah, on the south by the Pennair, and on the north by the Maidkoo primary channel, which latter is carried from the Main Canal with as flat a fall as possible (1 foot per mile for the greater part of its length). The District slopes generally from the primary towards the Pennair at the rate of from 10 to 5 feet per mile, but is cut up longitudinally into hollows and ridges by the Bookyapully, Nundipad, Soonkasala and Beechapully vunkahs. The general fall of the ridges is too rapid to allow ridge channels to be used, and it has therefore been necessary to let the irrigation water into the natural water-courses and to pick it up again when required.

17. As the levels of the district are very irregular it will be better to examine separately each natural division, and explain how it is proposed to irrigate it.

18. The land in Maidkoo and Mootaloorpad, lying between the Main Canal and the Bookyapully vunkah, contains 1,062 acres, and is commanded by the primary channel and the off-take channel which passes under the canal by the culvert at 171st mile. Subsidiary channels can be easily made from these to the whole of this part.

19. Toodoomuldiinna lying also between the Main Canal and the Bookyapully vunkah, contains 300 acres; water for which is brought from the west side of canal through the culvert at 173½ mile, where it is delivered at the highest point in Toodoomuldiinna.

20. Coming now to the lands between the Bookyapully and Nundipad vunkahs, containing 2,500 acres, the upper part will be irrigated by subsidiary channels direct from the primary. To

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facilitate the irrigation of the lower lying parts a channel for 1,062 acres is run from the Bookyapully vunkah, taking up by an anicut with side-slucies the necessary water for which will have been brought by sluices from the primary.

Drawing No. 7.

21. There remains the large village of Soonkasala between the Nundipad and Kazeepett vunkahs and south of the Kurnool-Cuddapah road, containing 2,500 acres. The water for this is dropped from the primary into the Nundipad vunkah, a small wall or floor to preserve the bed of the channel is all that is required at this place as the soil is hard kunkur. There already exists across this vunkah, at its junction with Annaloor vunkah, a weir of 143 feet crest, which was built for the supply of the Nundipad tank; from above it leads a channel passing under the Kurnool-Cuddapah road by a culvert of three openings of 4 feet, and leading to the tank. It is

Drawing No. 8.

proposed to make use of the works by placing an anicut of 16 feet crest across the tank supply channel and taking off above it a channel for 2,500 acres, a regulating sluice can be placed across the channel near its head, if thought necessary, but it is not included in the estimate. The supply for 2,500 acres is carried then to the Soonkasala vunkah, where it is dropped, to be shortly afterwards picked up and water for 11,000 acres (the

Drawing No. 9.

area between the Soonkasala and Kazeepett vunkahs) is carried on to the Beechapully vunkah. This latter is a small stream with a shallow valley, and water may be easily taken up from it. There already exists a weir across it, the property of Government. As the Soonkasala vunkah is too large to allow channels to be taken off where required, a channel for 500 acres is carried across to the Nundipad vunkah, from the anicut serving for the 1,100-acre channel above mentioned.

22. The Nundipad tank, which it will be necessary for the Company either to acquire or to arrange to supply with water, is said to be the property of the Reddy of Nundipad. It seems to be a thriving property, as it now irrigates 136 acres, and the owner is building a surplus weir and raising the banks which will enable him to irrigate in all 255 acres. The stream which supplies it is large and never fails to fill the tank. The same interference with Nundipad tank occurs at the crossing of the Annaloor vunkah by the primary channel, where we cross by an anicut, and in years of drought it would be urged on by the owner that water which would otherwise have filled his tank had been taken away by the Company's channels. In fact, if it is required not to interfere with this tank, we must carry 7,500 cubic yards an hour across the Nundipad and the Annaloor vunkahs by aqueducts. It would be very expensive to do so, as the Annaloor stream is a very large one and hard foundations are deep. Of course I assume that the owner has a right to the water in the stream, but am not sure of the law on this subject.

23. The summary of land irrigated in the Maidkoo district is as follows :—

Between canal and Bookyapully vunkah in }	supplied from primary	Acres.
Maidkoo and Mootaloorpad	channel	1,080
Bookyapully and Nundipad vunkah	do. do.	2,500
Nundipad and Kazeepett	do. do.	2,500

Total from primary... 6,080

Between canal and Bookyapully vunkah in Toodoomuldiinna supplied from Yaitoor channels ... 300

Total acres irrigated in Maidkoo district... 6,380

Total cubic yards required... 12,760

24. The total acreage which is supplied directly or indirectly by the primary as above shown ... 6,080
To this add for water sent to Yaitoor channels .. 5,654

Total ... 11,734

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The sum is the acreage which the first part of the Maidkoo primary must be capable of supplying.

Drawing No. 1.

This is taken off at the 169½ mile by an English sluice of ten openings, and is carried in a channel 42½ feet wide at bottom and 2½ feet deep to the

crossing of the west branch of the Bookyapully vunkah. It is here proposed to let into the vunkah for the Maidkoo secondary a supply for ... Acres 1,062

And for the supply of Yaitoor channels 5,654

There will also have been expended in irrigating Maidkoo and

Mootaloorpad, west of Bookyapully 1,005

In all .. 7,721

So that the quantity to be carried on by the second part of the primary is for acres 4,013. The vunkah is crossed by an anicut of 32 feet crest, and sluices are provided in it to throw into the vunkah a quantity equal to the difference in capacity between the first and second part of the primary, namely acres 7,721, or, say, 15,500 cubic yards per hour.

Drawing No. 2.

25. The second part of the primary is 13 feet wide and 2½ feet deep and falls 1 foot per mile. It crosses the Kurnool-Cuddapah road by a first-class bridge of two spans of 5 feet, two irrigation channels from the Maidkoo tank are then

Drawing No. 3.

passed over it in timber troughs, it then reaches the east branch of Bookyapully vunkah, which is crossed by an anicut of 50 feet crest, the inlet channel to Maidkoo second tank is next crossed by a culvert of four spans of 4 feet.

Drawing No. 4.

.. .. 5.

.. .. 6.

This is not an important tank and we do not at all interfere with it, but can fill it if it is found desirable. The new road from Podatoor to Nundialumpett is next crossed by a first-class bridge of two openings of 5 feet, and then there are no masonry works for 2 miles where the Nundipad

Drawing No. 5.

channel is reached. It is proposed to carry surface drainage across the channel by revetted out and in-lets. By this time there have been supplied with irrigation from

primary Acres 1,513

And there are here let into the Nundipad vunkah for the use

of the village of Soonkasala 2,500

Total .. 4,013

being the area for which the second part carries water.

26. It is undoubtedly more expensive to take off so much water at one point as is proposed in the plans under report, as it implies making channels for the purpose of carrying water parallel to the Main Canal, which could be done equally well by the Main Canal itself, but there are advantages which on the whole more than counterbalance the drawbacks. In the first place it is desirable to have an emptying sluice at the end of the long reach (26 miles) above Lock No. 1, and one would have to be built if the off-take of the Maidkoo channel did not supply its place. Again, if water were taken off between the locks the supply would have to be regulated by the lock sluices, and I am afraid this would be inconvenient and even dangerous when left to ignorant lock peons, so that the original plan would probably have to be reverted to of building calingulabs above each lock, for which 13,000 Rupees were formerly sanctioned, and this did not include, what would have to be built, bridges for roads across the waste weir channels round the locks. Again, the staff of peons required for irrigating sluices may be smaller when the sluices are all together as now proposed, but the principal advantage is the much greater ease of taking off water from the primaries than from the Main Canal.

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27. These remarks apply more to the Yaitoor than the Maidkoo irrigation district, as in the latter case the number of streams running parallel to the canal would probably make it as cheap in any case to take off from above Lock No. 1.

28. It has been assumed throughout that 500 acres in each square mile commanded are available for irrigation, and wherever acres are mentioned in this report the smaller quantity is meant, and not the whole area of the country commanded: that 2 cubic yards of water per hour are required for each acre irrigated. The formula for discharge is:—

Velocity in feet per sec. $92 \sqrt{\text{hyd. mean-depth inclination}}$, and the velocity has been made 2,000 yards per hour for larger, and 3,500 for the smaller channels.

29. The quantity per acre per hour which the channels have been calculated to carry is as follows:—

Areas.	Cubic yards per acre per hour.
200 to 300	8
300 to 400	7
400 to 500	6
500 to 750	5
750 to 1,000	4
1,000 to 2,000	3½
2,000 to 3,000	3
3,000 to 4,000	2½
4,000 to 5,000	2
above 5,000	2

But although the estimate has been framed according to this table it is proposed, in the first instance, to make the channels of rather smaller dimensions, that is to say all below 750 acres at the rate of 4 cubic yards per hour per acre, and all above 750 acres half cubic yards less than the table shows; the minimum rate (for above 4,000 acres) being 2 cubic yards per hour per acre. The land taken is wide enough to admit of the small increase necessary, and the spoil will be thrown wide enough to allow of a berm after the channels have been increased in width, should that be found necessary.

30. The plans are shown in the accompanying list.

31. The usual schedules of channels and villages are annexed.

List of Drawings to accompany Report on Maidkoo and Yaitoor Distribution.

General Plan No. 1, Maidkoo District.

Do. do. .. 2, Yaitoor ..

MASONRY WORKS.

- No. 1. Sluice of ten openings.
- .. 2. Anicut west branch, Bookyapully vunkah.
- .. 3. First class Bridge for main road.
- .. 4. Timber Aqueduct for crossing Maidkoo primary (for existing irrigation).
- .. 5. Anicut east branch of Bookyapully vunkah.
- .. 6. Culvert for supply of tank.
- .. 7. Anicut and off-take, Bookyapully vunkah.
- .. 8. Soonkasala Anicut.
- .. 9. Beechapully do.
- .. 10. Anicut and headworks above Mittatoor tank.
- .. 11. Six-inch falls in Yaitoor primary.
- .. 12. Three feet overfall, Yaitoor primary.
- .. 13. Bridge and overfall
- .. 14. Sluice for 11,304 cubic yards per hour in the Yaitoor supply-channel.

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Three village land plans, Maidkoo District, namely, Maidkoo, Nundialumpett, Soonkasala, numbered 1 to 3.

Eleven land plans, Yaitoor District, namely, Maidkoo, Buderapully, Alludpully, Pedda Goodaloor, Chinna Goodaloor, Mittatoor, Yaitoor, Thippaipully, Komaloor, Mootaloorpad Toodo-muldinna, Nos. 4 to 14.

(Signed) G. GORDON.

From the Consulting Engineer for the Madras Irrigation and Canal Company, to the Agent and Manager of the Madras Irrigation and Canal Company, dated 17th December 1870, No. 276.

I HAVE the honour to acknowledge your No. 509, of the 6th instant, requesting Government sanction to an expenditure of Rupees 33,122-4-0 for certain distribution works under the 9th Section of the Main Canal, and to inform you that it appears to me, on examination of the survey plans, that in the preparation of this project due attention has not been paid to the Proceedings of Government No. 610, 26th March 1861. Provision is therein made that the Company's works shall not injuriously affect any existing irrigation works, and in the 25th paragraph of Mr. Gordon's report he has correctly described the manner in which existing interests should in all cases be protected. Describing the course of a primary channel, he says:—

"The inlet channel to Maidkoo second tank is next crossed by a culvert of four spans of 4 feet. This is not an important tank, and we do not at all interfere with it, but can fill it if it is found desirable."

I do not think that the proper mode of dealing with all tanks, or indeed with any existing supply of water for irrigation, could be described in more appropriate language; yet, in the same project, other interests are treated very differently.

With respect to the Mittatoor tank the Chief Engineer thinks "it will be best for the Company to take it over," but other people's property cannot be taken possession of in this summary manner, nor could sanction be given for the Company appropriating the Yaitoor vunkah, which supplies the tank, by building an anicut across it, until satisfactory arrangements had been made with the owners of the tank. It is not very material what is the cause of the alleged disuse of the tank; the Chief Engineer attributes it to the decay of the artificial supply-channel; but it seems to me that the tank has a prescriptive right to the 11,117 cubic yards an hour of water, for the passage of which a culvert has been provided under the Main Canal. Mr. Gordon in his paragraph 8 suggests as an alternative that the Company might arrange to supply the tank with sufficient water for its present irrigation. It is improbable that the owners would consent to this.

2. With regard to the Nundipad tank, the Chief Engineer does not see any need to interfere with it, as the Company might guarantee a full supply yearly without any expense or waste of water; but seeing that his design provides for taking possession of the weir on the Nundipad vunkah, and that a large channel branches off the supply-channel of the tank, the interference is very serious, and it would be necessary to obtain the consent of the owner of the tank to whatever is done. Mr. Gordon describes the adjoining land as a thriving property, and that the owner is improving the tank to enable him to extend the irrigation. The supply-stream, it is stated, never fails, from which I infer that he would expect the Company to fill his tank free of charge as often as he required so long as the Company's canal had water, and afterwards to leave at his disposal the water in the vunkah in the dry season.

3. I have further to observe that in Mr. Gordon's 22nd paragraph he mentions:—
"The same interference with Nundipad tank occurs at the crossing of the Annaloor vunkah by the primary channel, etc.;" but all this arrangement on the plans appears to have been changed in the Chief Engineer's Office, while the report is left unaltered, and there are other discrepancies; in fact the report and its illustrations do not agree. This requires correction.

4. I regret the delay that will be necessarily caused by this reference, but the papers have not been properly examined and arranged before being sent to me; there is not even the usual

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estimate, nothing but a concise abstract which is of no use, neither are there any cross sections of the channels as is usual.

5. I must also take exception to the provision of only 6 Annas an acre for the channels that will be necessary in addition to those estimated for. In former distribution projects, where the channels estimated for were primary and secondary, or primary, secondary, and minor, (see the 6th Section,) and the area to be irrigated under each smaller channel was limited, 6 Annas an acre was admitted as a suitable provision for the immediate delivery of the water to the fields; but in the scheme under review the blocks of land to be watered by each channel are very large, as much as 3,000, 4,000, and 5,000 acres. I request to be favoured with a decided expression of opinion by the Chief Engineer as to the sufficiency of 6 Annas an acre for this distribution of water. My own impression is that double the amount would not be enough. I do not return the drawings and report, because their further examination can be proceeded with while this reference is being considered, and they can be exchanged for corrected copies hereafter.

From the Agent and Manager of the Madras Irrigation and Canal Company, to the Consulting Engineer for Irrigation and Canal Company, dated Madras, 28th March 1871, No. 139.

I HAVE the honour to transmit copy of Mr. Gordon's letter, No. 100, dated 13th February 1871, with the Chief Engineer's endorsement, No. 390, of 14th instant, together with the revised plans and estimates, as particularized below, of the Maidkoo and Yaitoor distribution districts in the 9th Section, and to request sanction for Rupees 30,200, and for a further sum of Rupees 2,925 to be kept in reserve for the lower portion:—

MEMORANDUM.

Drawings.

- 2 Plans of Aqueduct over Bookyapully vunkah.
- 1 Plan of do. Mittatoor tank supply.
- 1 Do. of Masonry Channel across waste, etc.
- 1 Do. of Sluice Maidkoo, secondary.
- 2 Do. general of Maidkoo and Yaitoor Districts.

Estimates.

- 1 General Abstract Estimate.
- 1 Tabular Statement.
- 1 Abstract Estimate.
- 1 Detailed do.

From G. GORDON, Esq., Deputy Chief Engineer, to the Chief Engineer of the Madras Irrigation and Canal Company, dated Cuddapah, 13th February 1871, No. 100.

I HAVE the honour to forward herewith revised plans and estimates of the Maidkoo and Yaitoor distribution districts in the 9th Section. On the 9th January your letter No. 5 informed me of the Consulting Engineer's objection to the plan proposed, of making use of the supply-channel of Maidkoo tank and of acquiring the proprietorship of the tank, and of the interference with the Nundipad tank without first getting the consent of the owners.

2. I at once made inquiries of the owners of the tank, and the result of them is that while the Mittatoor owners might in course of time be brought to see that it would be advantageous to them to have a ready means of supply in times of drought, yet negotiations with them would take so long that I thought it better to alter the design by which water was brought from the Maidkoo side to the Yaitoor side by means of the channel, and to enlarge the Yaitoor primary so as to carry all the water needed for that side without any interference with their tank at all. This plan is more expensive, but better in several ways than the other; first, all disputes about the right to the water will be avoided; second, the water will be more under control than by the first plan where, at three places at least, a division of the water to the Company's consumers and to the

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tank owners would have had to be made; third, less maintenance on account of drainage crossed or intercepted will be needed, the channels being now chiefly ridge channels.

3. The interference with the other tank, the Nundipad, though similar in kind, met at first with no opposition on the part of the owners, who see an equivalent to the free use of their anicut and channel in the liability of the Company to keep them in repair. They promised to sign an agreement by which the Company should be at liberty to use their anicut and channel, but they have now begun to stipulate for a free supply of water for two crops for 500 acres. Also some statements they made showed they were not to be trusted, and I therefore recommend that, for the present, the works proposed for irrigating 2,500 acres below their off-take be abandoned or at least postponed until it is seen whether there will be sooner a demand for water there than in the lands referred to below paragraph 6.

4. The general description of the country proposed to be irrigated being given at length in paragraphs 1 to 5, and 16 to 21 of my report, dated 26th November 1870, I need not repeat it; but I will now describe the course of the water for each district, which is much simpler than it was before.

5. The Maidkooor district is supposed to contain 6,500 acres of irrigable land, and is entirely supplied from a sluice in the Main Canal of six openings with the exception of 300 acres in Toodoomuldiinna, which are supplied from a branch of the Yaitoor works.

6. The Maidkooor primary leading from this sluice carries the whole of the water, but it is only reckoned that 4,000 acres will be irrigated from it and from the Maidkooor secondary direct. There are two areas separated by the Bookyapully vunkah on which the remaining water (for 2,500 acres) could be distributed. The last plan showed the land under the off-take for the Soonkasala channel. A former plan showed 2,215 acres, between the Main Canal and the Bookyapully vunkah irrigated by water passed down by the lock sluices, which was considered objectionable, and the channels were abandoned. This land could be reached from the Bookyapully vunkah, into which the necessary water could either be turned out of the Maidkooor secondary, enlarged, (by the drainage at Palinen), or if it is found better to adhere to the plan of watering the land near Soonkasala, the water could be sent down the Nundipad vunkah as was proposed when it was intended to make use of the Nundipad tank supply-channel.

7. There is more land, according to the calculations adopted (500 acres per square mile), than the water will supply, and it is better to defer the construction of channels until it is known when the water will most likely be wanted. In the meantime the works proposed to be carried out, i.e., the Maidkooor primary, will provide for the water being sent down either to the probable off-take for the lands next the canal, which would be just below the junction of the Bookyapully and Nundipad streams, or to any work it may be proposed to construct for carrying the water to the Soonkasala lands. I hope no objection will be made to this alternative plan and to reserving a sum for it. Government have approved the principle of leaving, for the present, the construction of some of the channels, and it will certainly be to the advantage of the Company that they should not have to construct works which in all probability will not be wanted for several seasons, while they would require repairs every year. The estimate for the Soonkasala channels amounted to Rupees 1,973, and I think if the other land is chosen the same sum will suffice for them, or, say, Rupees 2,000, and if to that is added minor irrigation, at 6 Annas per acre, the sum required to be reserved would be Rupees 2,925.

8. The Maidkooor district therefore, as at present proposed for sanction, contains 4,000 acres, with the capacity, as to the head sluice and primary channel, of supplying 2,500 acres additional in the lower part of the district for the works in which it is proposed to reserve a sum of Rupees 2,925.

9. The Maidkooor channel in its first part, as far as the west branch of the Bookyapully vunkah, carries 13,000 cubic yards per hour. The second part carries 12,000 cubic yards, and although the Maidkooor secondary takes off by a sluice placed in the primary, about 2½ miles from its head, a supply for 1,000 acres, the capacity of the primary is not diminished, but continues the same to the end, as the alternative plan described in paragraph 7 requires the supply of 7,500 cubic yards per hour to be allowed for and the relative capacity of the canal increases when the area irrigated decreases

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according to Major Mullins' scale. The Maidkooor secondary is in the first part of its course, as far as Paliem, a ridge channel with twenty-one falls or repairs in addition to its normal fall of 5 feet per mile. Near Paliem it crosses a drainage which could be used for sending water down to the lower district if the lands next the canal (paragraph 7) are to be irrigated. In either case the expense will be about the same, because if the Soonkasala lands are not to be irrigated the supply of 7,500 cubic yards need not be carried beyond the Maidkooor secondary sluice, and the reduction of the sectional area of the primary would be set off against the enlargement of the secondary down to Paliem which would then be necessary.

10. The masonry works on this district are—

1. A sluice of six openings (Drawing No. 1).

2. An aqueduct across the west branch of the Bookyapully vunkah (Drawing 2-A), instead of the anicut formerly proposed, which would have intercepted the water to the Mittatoor tank. A fall of about 1½ inch is allowed over this aqueduct.

3. A bridge for the Kurnool-Cuddapah road and another for the Podatoor Nundialumpet road (Drawing No. 3).

4. Two timber troughs to carry the irrigation water from the Maidkooor tank across the primary (Drawing No. 4).

5. A covered aqueduct across the east branch of the Bookyapully vunkah (Drawing No. 5). This supersedes the calingulah (Drawing No. 5) first submitted. The bed of the sandy stream is so high that the arches of an aqueduct of the ordinary kind would be closed up by the stream altogether after every fresh; I therefore propose to let the freshes pass over this aqueduct, and to allow the small quantity of water ponded up by it, which would otherwise obstruct the drainage of fields above, to soak away through openings left in the substructure of the aqueduct. This work will only raise the bed of the stream above it 1-25 feet, and floods probably less than one foot. The waterway allowed under the Cuddapah road for this stream is only six 3 feet and three 2 feet 9 inches vents. For the west branch only three 4 feet vents and in the new Nundialumpet road three 3 feet spans.

6. A culvert for the supply of the second Maidkooor tank (Drawing No. 6).

7. On the Maidkooor secondary a sluice for the supply of Maidkooor secondary (Drawing No. 17).

8. A first-class bridge for the Cuddapah road.

9. A second-class bridge at Paliem and another near Mittalumpaud.

3A. Drainage culvert near Paliem and on both channels where required six paved fords

10A. The Maidkooor primary interferes injuriously with no irrigation or drainage. It necessarily passes through some wet cultivation north and east of Maidkooor, but the levels made this unavoidable. The Maidkooor secondary is outside of the wet cultivation and drainage is provided, for small surface nullahs are taken in and out by paved slopes.

11. The Yaitoor District, which contains 10,230 acres, is supplied from one sluice in the canal above the first lock, it will require ten openings. The interference with the Mittatoor tank mentioned above as involved in the first scheme and avoided in this was as follows: In order to avoid carrying so large a body of water, as is required for this district, all the way down the steep gradient of the Yaitoor primary, a part of it (11,304 cubic yards per hour) was taken down the Maidkooor primary as far as the Bookyapully vunkah, into which it was discharged, and from which it was again taken out by an anicut at the head of the supply-channel to the Mittatoor tank. The supply was taken down this supply-channel to a point a little above tank, where it was divided by

• Maximum.

an anicut with two side sluices, the one on the right giving a supplemental supply of 11,400* cubic yards per hour to the Yaitoor primary, and the other to the left taking off 3,900* cubic yards per hour by the Mootaloorpad channel, the tank being supplied over the anicut or through sluices in it. This plan is abandoned, and the Yaitoor primary now carries the whole of the water used in the district, and that for 300 acres on the east side of the Main Canal directly from the Main Canal at the ten vent sluice mentioned above.

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12. At the end of the first part the supply required for the Mittaloorpau irrigation is taken off by a secondary channel, called the Mittaloorpau channel, and the primary goes on as on the original plans, except that it carries the additional water in its second, third, and fourth parts, which it was first proposed to bring down the supply-channel into the fifth part of the primary. The capacity of each part is shown on the plan, there being no alteration below the end of part 4 except that it is not now proposed to divert the waste channel of the tank but to cross it by a masonry work described below.

13. The Mittaloorpau secondary goes down a rather steep ridge by a fall of 7 feet per mile and 8 feet 9 inches over falls to near Kistumpully, where, in order to avoid some well cultivation and also to reach the Mittatoor supply-channel at a suitable place for crossings, it turns a little to the left, and, falling 4 feet per mile, reaches the supply-channel near the main canal crossing the former by an aqueduct (Drawing No. 15). It again becomes a ridge channel until it joins the Mittaloorpau channel as formerly laid out, the last part of the Mittaloorpau channel and the branch, called the culvert channel, remain unaltered.

14. The masonry works required on the Yaitoor primary are :—

1. Sluice of ten openings (Drawing No. 1).
2. An overfall (Drawing No. 12).
3. A first-class bridge and overfall (Drawing No. 13) for the Podatoor road (length of overfall increased).
4. Three second-class bridges for Goodaloor, Chinnumpully, and Yaitoor.

5. A work for crossing the Mittatoor tank waste (Drawing No. 16). The latter is found to be cheaper than diverting the waste channel; it is an open masonry channel which the water from the tank may pass over, as it is sunk in the ground, if indeed any water ever overflows from the tank, which does not appear at present to be the case. Possible floods are prevented from going down the channel by planks put across the lower end with the lower edge just above the ordinary maximum water-line of the primary channel; a fall of 1 foot in the length of this work (40 feet) is allowed, none of the other work seems to need special notice.

15. The masonry works on the Mittaloorpau secondary are :—

1. A second-class bridge near Kistnanpully.
2. Two small drainage culverts near the same place.
3. An aqueduct over the supply to Mittatoor tank (Drawing No. 15).
4. A second-class bridge for the road leading to Lock No. 4.

16. Thus, in the Yaitoor District, there is no interference with irrigation channels or tanks, and the small amount of drainage that has to be considered is provided for.

17. I have no data as to the cost of the minor distribution channels, but possibly it is now approximately known from the works in the upper portion of the canal.

18. There is no doubt it will be years before the whole of the land proposed to be irrigated is ready for the water. At the same time it is necessary, I think, to show the people that water can be delivered where it is wanted by constructing some of the main channels. I would, therefore, recommend that although sanction is asked for the completion of the works shown on the revised plans, Government should be asked to allow the construction of the channels to stop short at the following limits at present, *without prejudice to the contract*, namely :—

1. The Maidkoo primary channel complete. This will send water down to the Soonkasala and Towarpully lands and as far as the works first proposed go.
2. The Yaitoor primary as far as the end of the 7th part.
3. The Toodoomulidinna channel as far as and including the aqueduct over the supply-channel. The Company should, however, be allowed, if it seemed in course of construction that water would be required within a season or so, to construct more of the channels or, at all events, the masonry works.

19. As the alterations in the plans are chiefly in figures and names I have only sent in tracings of the centre lines of channels, from which the general plans originally sent can be corrected.

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20. Of the masonry drawings formerly sent in the following are superseded or cancelled, namely :—

- | | | |
|---------|--------------------|---------------------------|
| No. 2. | Superseded by 2 A. | Central office No. 551 A. |
| No. 5. | do. | 5 A. Do. 554 A. |
| No. 7. | Cancelled. | (Work abandoned.) |
| No. 8. | do. | do. |
| No. 9. | do. | do. |
| No. 10. | do. | do. |
| No. 14. | do. | do. |

And the following additional plans are sent herewith :—

No. 15. Aqueduct for Mittaloorpau channel over the tank supply.

No. 16. Masonry channel for crossing waste from Mittatoor tank.

No. 17. Sluice for Maidkoo secondary. The enlarged section of the Yaitoor primary required additions to be made to the lengths of the overfalls. This has been done in the estimates.

21. As required by the Consulting Engineer, detail estimates of the earthwork and masonry works are supplied. An abstract of them is annexed. From this it will be seen that the

Exclusive of the 2,500 acres postponed.

Maidkoo district of 4,000 acres is estimated to cost Rupees 11,400, or Rupees 2-13-7 per acre, but this includes the necessary capacity at the head-works and primary channels for 2,500 acres additional. Yaitoor district, 10,230 acres, Rupees 18,800, or Rupees 1-13-5 per acre, and the average of the two districts Rs. 2-2-0 per acre, including minor distribution at the rate of 6 Annas per acre.

22. I have the honour to request that if you approve of the above project as altered you will apply for sanction to the amount of Rupees 30,200, and for a further sum of Rupees 2,925 to be kept in reserve for the lower portion.

No. 390.

To the Agent and Manager.

Forwarded with recommendation that sanction be asked.

As to the rate for subsidiary channels experience only can decide. I believe the rate of 6 Annas an acre will enable the Company to do all that will be required or desirable to distribute the water to each field commanded.

AYALORE,
14th March 1871.

(Signed) J. H. LATHAM,
Chief Engineer.

No. 320.

ORDER THEREON, 17th May 1871, No. 1,364.

IRRIGATION, No. 18.

WITH this letter the Consulting Engineer for the Madras Irrigation and Canal Company submits estimates amounting to Rupees 33,125 for the distribution works in the Yaitoor and Maidkoo Districts in the 9th Section of the Company's canal.

2. The total area which the works are designed to irrigate is 16,730 acres, and the cost of distribution is therefore about 2 Rupees an acre.

3. The amount already sanctioned in G. O., No. 2,786, dated 10th September 1867, for the distribution works under notice, is Rupees 11,525 which being

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deducted from the total of the estimates now submitted, leaves Rupees 21,600
which His Excellency the Governor in Council resolves to sanction.
(True Extract.)

Colonel, R.E.,
Secretary to Government.

To the Acting Chief Engineer for Irrigation.
Agent and Manager for the Madras Irrigation and Canal Company.

Ed. S. T. Augustin.

Consulting Engineer
Irrigation & Canal Company
Madras, 24 April 71

No 10
To
Colonel, R.E.
Secretary to Government
Public Works Department

Have the honor to submit the report
received in the margin relating
to the distribution works in the 2nd irrigation
range under the G. Section of the Madras Canal.
The schemes as originally designed were
first received with the letter No. 509
6 December 1870, but as it was found that
existing interests were injuriously affected
by some of the arrangements proposed, and
that the consent of the owners of tanks and
channels had not been obtained, I felt it
necessary to return the projects for recon-
sideration by No. 276-17, December 1870.
The schemes have now in a great mea-
sure been rearranged, and as far as appears
free from the objections noticed above. They
are explained in detail in the Deputy Chief Engineer's
report

From G.O. No. 509-6 Dec 70
To No. 276-17
From No. 139-28 March 71
14 Plans
4 Estimates
21

report which accompanies the Coghlin's last named
letter No. 139-28 March 1877 in the tenth
paragraph of which he remarks that no ex-
isting irrigation or drainage is injuriously in-
terfered with further than that in some
cases channels pass through wet cultivation
which however was unavoidable and the
Revenue authorities will no doubt see that
the ryots receive equitable compensation.

4. Mr Gordon has so fully described the
course taken by each channel and the site
of each masonry works it only remains for
me briefly to notice the chief features of
the schemes.

The irrigation consists of two plots, one on the
right side of the Main Canal called the Caitoor
District and the other on the left side called the
Maidtūr District, the former extending from the
168th to the 177th mile, and the latter from the
168th to the 175th mile.

5. For the Caitoor District the supply is taken
off the Main Canal by a sluice of 10 vents in
the 169th mile where one long channel called
the Caitoor primary carries water for 10,230
acres the part of which is distributed direct
from the channel only 4,221 cubic yards an hour
being parted with for the irrigation of 1,206 acres
under a supplementary channel called Moolaloo-
pā - these channels are shown on Drawing No.
565A and their further extension on No. 565B
November

November 1870. —
6. For the Maidtūr District the supply is
taken off the Main Canal by a sluice of 6 vents
in the 169th mile. — The channels are designated —
Maidtūr primary, and Maidtūr secondary, and their course is shown
on Drawing No. 564A. — The area to be eventually
irrigated is 6,500 acres exclusive of 350 acres
supplied from a branch of the Caitoor
works on the opposite side of the Main Canal
by water carried under it in a culvert. Of the
6,500 acres, it is proposed to construct channels
for 4,000 only at present, though the head works
and primary channels as designed and will be con-
structed to carry water for the larger area. At
this point the Deputy Chief Engineer
observes that there is more land commanded
than there is water available, and that it is
advisable to defer the construction of some
of the channels until it is known where the
demand for water will be, and with this object
it is proposed that the estimated cost of the
minor channels for 2,500 acres, namely Rs. 2,925
of the amount for which sanction is now
asked, shall for the present be retained unex-
pended. —

Estimate
Maidtūr 4,000 acres
Sluice in Main Canal Rs. 900
Channels & earthwork Rs. 5,530
Masonry works 3,470
Subsidiary channels at 60s. per acre 1,500
Channels & masonry work for an additional
2,500 acres hereafter 2,925
Total Rs. 17,325

Cartoon - 10230 acres

Sluices in Main Canal Rs 1400

Channels earthwork Rs 10754

masonry work Rs 2810

Subsidiary channels at 6 Rs per acre 3836

Total 33125

for the irrigation of 16749 acres giving about
 Rupees 2 an acre which is a fair average -
 Looking to the comparatively large blocks
 of land to be watered from each length of chan-
 nel it is estimated the allowance of six annas
 an acre, and requested the Chief Engineer's re-
 sponse to this - His reply that experience
 only can decide as to the sufficiency of the
 rate, but he is of opinion that six annas an
 acre will enable the Company to do all that
 is required for the delivery of the water to each
 field commanded.

The Masonry works the site of which are shown
on the surveys are -

for Cartoon District

One head sluice

one aqueduct

one sluice

one 1st class bridge

four 2nd

one masonry channel

two drainage crossings

sixty overfalls

six paved fords

sites undetermined

Mandla District

Mandla District

One head sluice

two irrigation sluices

two aqueducts

three 1st class bridges

two timber bridges

one culvert

two 2nd class bridges

one drainage crossing

twenty one overfalls sites undetermined

six paved fords

The rates are -

Excavation - 10 cub yards per rupee.

Rubble masonry - 4 Rs. per cub yard.

Concrete - 3 - - - - -

Rubble - 4 to 6 annas per - - - - -

Concrete floor - Rs. 2-0 - - - - -

Archwood - 6 - - - - -

Teakwood - 6 - - - - - cub foot

Stone pitching - 10-2 - - - - -

Rubble apron - 1 - - - - -

which excepting concrete which is high and
teakwood which is enormous, are fair.

10. I recommend the estimates for execution -
 The previous sanction for the distribution works
 of the G. Section as given in Government Order
 No. 2786 of the 10th September 1867 is Rupees 15125
 for sluices of which Rupees 3000 were allotted
 in the estimates for the 1st range of the distribution
 works of the G. Section forwarded with my letter
 No. 1 of the 4th instant the remainder of Rupees 11525
 should therefore be deducted from the total
 amount of the estimate now submitted - the amount
 now

Have the honor to be,

Journal of the Oregon Land

Wm. B. Caldwell

Wm. H. O. Co. —

W. M. B.

The above is a list of the names of the persons who have been
 admitted to the office of the Secretary of the Board of
 Education, since the last meeting of the Board, on the 1st
 of January, 1871. The names are given in the order in which
 they were admitted, and are accompanied by the date of their
 admission, and the name of the person who presented them.
 The names are given in the order in which they were admitted, and
 are accompanied by the date of their admission, and the name of the
 person who presented them.

[illegible]

Geo. Dyer

1364

Proceedings of the Madras Government.

Under date the 17th May 1871.

Read the following

From the Const. Reg.

St. Catharine (nms) Here under No. 10 of 24 April 1891.

With this letter the
 Consulting Engineer for the
 Madras Irrigation and
 Canal Company sub-
 mits estimates amounting
 to Rupees 33,125 for the
 distribution works in
 the Guntur and Madhura
 Districts in the ninth
 section of the Company's
 canal.

The total area
which the works are
designed to irrigate is
16,730 acres, and the
cost

cost of distribution is there.

fore about 2 Rs an acre.

The amount already sanctioned in G.O. No. 2786

dated 10 September 1867

for the distribution works

under notice is Rs 11525

which being deducted

from the total of the

estimates now submitted

leaves Rs 21600 which

His Excellency the Governor

in Council resolves to

sanction.

[Signature]

Ch. Inam for Engrs
The ~~Manager~~ ^{Agent} of the
twenty one enclosures
Agent of Manager. Do

Recd 20/5/71

Govt of 1871 Madras.

PUBLIC WORKS.

To. The Chief Engineer
Irrigation

Dated

Recd.

Encl.

G. O. 17 May 1871, No. 1364.

Nos. 3148-320

Distribution Works. Rs. 21,600

for distribution works in the
Tanjore & Madhavaram Districts
in the 4th Division of the Madras
Provinces, enclosed.

6-2-1871 or 3rd May

Pro 10 September /67 No 217 - 220
" 16 March /71 — 395 - 396