

- (1) Number of pages 14
(2) Date of repair 4.6.86
(3) Initials of the Referencer lmg ✓

TAMIL NADU ARCHIVES

GOVERNMENT OF TAMIL NADU

Rev. DEPARTMENT

G.O. No.	2233	Press.
B.P. No.		Mis.
Dated	19.4.1877	197.

lmg ✓
Not to be folded or roughly handled

Read the following papers:—

No. 779. From J. D. GRANT, Esq., Officiating District Engineer, Tinnevely, to the Chief Engineer for Irrigation, dated Palamcottah, 25th January 1877, No. 170.

THE complaints of the cultivators under the south main channel of the Striviguntum anicut project have been so constant, and their statements regarding the insufficiency of water apparently so well founded, that it was determined to investigate the whole question carefully *ab initio*, and I have the honor now to forward, for your instructions, the result of the calculations, &c., drawn up by Mr. Hughes.

2. In order, as far as possible, to get at the root of the matter, a series of gaugings was taken by Sub-Conductor Falvey, in a straight reach of the channel, half a mile from the head sluice, and, though these gaugings are few in number and necessarily somewhat rough, they were, however, taken with great care and as much accuracy as circumstances would permit, and cannot but afford useful data for arriving at the true discharge of the channel.

3. From these gaugings—

The mean velocity was found to be	...	...	...	1.714
Hydraulic mean depth being	...	...	...	4.701
Mean area of section	...	...	...	315.16
Surface fall	...	...	...	$\frac{1}{7200}$

Applying to this the formula given at page 33 of the 3rd Edition of Jackson's Hydraulic Manual, the mean velocity is found to be 1.0675, making the discharge 336.28 cubic feet per second, from which again the co-efficient of the head sluice is found to be .906.

4. Again, using the formula on page 34 of the Manual previously quoted (C having been found = 41.21) the co-efficient of friction is found to be .05, from which, in the accompanying memorandum, a table is given showing C for different hydraulic mean depths.

5. The accuracy of all these calculations of course depend, in great measure, on the accuracy of the formula given in the Hydraulic Manual used, but there would seem no doubt that the formula for channels $V = 100 \sqrt{RS}$ is very incorrect, and that the formula for sluices $V = C \sqrt{2gh}$, when C varies from .62 to .75 is also wrong.

6. Having obtained what appear to be correct data, the next thing is to apply them to the channel which cultivates 7,000 acres, against 5,650 under the north channel.

7. The tank capacity under the south channel is to that under the north channel in about the proportion 6 to 5, so that if, as would appear best, the water be divided proportionately to the tank capacity, the south channel should get six-eleventh of the supply in the river.

8. To effect this, the supply of the south main channel must be increased, and this may be done in two ways—

- either (1) by widening the channel leaving the head sluice unaltered.
- or (2) by increasing the size of the head sluice and widening the channel.

9. By the first plan, in order to give the south main channel its fair share of water, it would be necessary to widen the channel to 57 feet at a cost of about 20,100 Rupees. This plan has the objection, however, that it dangerously diminishes the berm, and that there would be a difficulty in getting rid of the excavated material.

10. If it is considered better to add three vents to the head sluice and widen the channel 9 feet (or to 45 feet), the cost would be only 15,100 Rupees.

11. The result of these improvements if executed would be (taking the channel as full for sixty days) an increase of discharge of nearly 420 million cubic feet of water, a quantity equal to about half the tank capacity.

12. Next in importance to the main channel is the Ahtur channel, where for a series of years there has been loss of crop and much trouble in the distribution of the water available.

13. The discharge of the main channel being 413 feet per second, the Ahtur channel is entitled to 40 per cent. or 165 cubic feet; to carry which quantity, it would be necessary to enlarge the present channel to 27 feet at bottom; this would be expensive and dangerously reduce the berms.

14. It would however be possible to increase the fall to 2 feet per mile by lowering the aqueduct (now converted into a drop) and thus render a bottom width of 18 feet sufficient, and with provision for supplying Sathukavoitan tank, its due share of water could be drawn off by the Ahtur channel.

15. The Ahtur tanks are found to be in sufficient water for only twenty-three days' supply to the cultivation, and, owing to the exceedingly variable supply in the river, it would be advisable, as much as possible, to increase their capacity. They cannot be raised to a greater height than the existing one, but by the improvements proposed to the river, rendering it capable of filling the tanks with the improvements proposed to the river, rendering it capable of filling the tanks in nine days, a very material improvement could be effected, and even if nothing is done to the channel, the repair of the tanks must be carried out.

16. The cost of improving the channel, &c., will be Rupees 7,800, against which, however, should be set the annual cost of maintaining the temporary dam in the river at the old head sluice, viz., Rupees 290.

17. A short time ago, with your permission, the aqueduct near the old head sluice was converted into a drop, and to a great measure, owing to this improvement, all the land this year cultivated under the tank (about half the ayacut) will be saved. The figures given in the accompanying memorandum may not be all absolutely correct, as at this time a pressure of other work is occupying every one's attention, thus preventing my going through the figures very carefully, a few inaccuracies I have detected and altered.

18. The calculations are, however, I think sufficient to show that there is something radically wrong with the channel, I point clearly to the remedy, and I have the honor to request that you will consider the subject and favor me with instructions.

From the same officer, dated Palamecottah, 28th February 1877, No. 192.

I HAVE the honor to inquire whether I may go on with the preparation of estimates for the improvements to Ahtur channel mentioned in my letter, No. 170, of 25th

January 1877. If this is to be done, I request permission to alter in one particular the arrangements described, as from recent experience, it does not seem advisable to leave the two bridges in Ahtur channel of 10 feet span only.

2. Since knocking down the side wall of the aqueduct, the surface fall has been considerably increased, the result being that the velocity through the present bridges of 8 feet waterway is too great.

3. I propose, therefore, to increase the waterway as much as necessary, and, if in other particulars you approve the proposals, I would go on with the preparation of the estimates.

From the same Officer, dated Palamecottah, 23rd March 1877, No. 202.

In reference to your memorandum No. 17 T N, of 13th instant, I have the honor to forward a correct copy of Mr. Hughes' Memorandum on the proposed improvements of water-supply to south main channel, Striviguntum anicut project.

Memorandum on proposed Improvement of Water-supply to South Section of Striviguntum Anicut Works.

THE principle having been laid down that water taken off from the river at Striviguntum should, in the first place, be supplied to the tanks and irrigated before the construction of the anicut, and the surplus only rendered available for extension of cultivation, certain modifications in the existing works are required in order to distribute the supply more nearly than now in proportion to the acreage of old irrigation on either side of the river. There are no accounts in this office to show what the exact acreage is, but from the returns of actual cultivation it appears to be about—

	ACRES.
For the south section	7,150
Do. north „	5,650

or nearly in the proportion of 5:4. Should the probable extension of cultivation be also taken into account, nearly the same proportion would be arrived at for the distribution. The extent of new cultivation will depend entirely on the quantity of water available in the tanks, as the ryots are most anxious to extend the irrigation as quickly as possible, and have taken up for wet cultivation under all the tanks of the south section some of the north section quite as much land as can ever be irrigated from them. In considering the ultimate extent of cultivation there would be an obvious advantage in dividing the supply in proportion to the tank capacity, and as those of the south section are about one-fifth times the capacity of those of the north, while they receive less drainage, they ought to get more than six-eleventh of the water taken off from the river.

2. The question is thus reduced to a consideration of the best manner of regulating the distribution so as to give five-ninths of the river supply to the south section. This cannot be done by any regulation of the sluices, but must be effected by improving the south channel or channel and head sluice. The channel is much too small, and is found incapable of filling the tanks without a succession of good freshes, and the discharging capacity as explained below is for a given depth only about two-fifths of that calculated on when the work was projected; but by running it somewhat deeper than formerly intended we get a discharge during freshes of

about half that calculated on. A good deal of water goes to waste over the anicut, but the north channel is sufficiently large for present needs, and only the south channel requires improvement.

3. Before proceeding with calculations for this work a few words are necessary regarding the formulae and coefficients in most general use for estimating the discharge of channels and sluices. That most frequently used for channels is of the form

$D = A V = A \times 100 \sqrt{RS}$, A being the area of water section, R the hydraulic mean depth, and S the sine of the surface fall, and for sluices $D = A V = A \times C \times \sqrt{2gh}$, C being taken at from .62 to .75. It became evident from watching the discharge of the head sluices into the Strviguntum main channels that the results given by these formulae are widely inconsistent, and to ascertain approximately the amount of error, some gaugings of the south main channel have been made by the Sub-division Officer, Mr. Falvey. The observations were made with care, and for this particular instance afford a sufficiently near approximation, but do not pretend to great exactitude as the number of observations was small. A straight reach of the channel was selected about half a mile from the head, and 360 feet length and the velocity observed at intervals of 120 feet. When the water subsided sufficiently cross sections were taken at the points of observation. The part of channel selected is in rather stiff clay cutting and the bed and sides are pretty free from grass and weeds. There is no drainage into the channel between this part and the head. The sectional area varied from 307 to 329 square feet.

The results obtained are as follow:—

Mean area of four sections ...	315.16 square feet.
Mean hydraulic, mean depth ...	4.701 feet.
Maximum velocity ...	1.714 feet per second.
Surface fall ...	$\frac{1}{7200}$

The mean velocity was obtained from

$$V_m = \frac{1}{\sqrt{RS}}$$

(When V_m and V_x are the mean and maximum velocities, R the hydraulic mean depth and S the sine of the surface slope) and was found to be 1.0675 feet per second. The discharge was, therefore, 336.28 cubic feet per second. The area of head sluice vents open was 45 square feet, the measured head 1 foot, and the velocity of approach at gauge 2 feet per second, whence the co-efficient for the sluice is .90. The floor and sides of vents are of dressed granite. The vents are 4 feet width: the cut waters are equilateral triangles in plan and have sharp edges and the rear wings are curved outwards from the vents. The co-efficient deduced from the calculation of the channel discharge assuming the correctness of Bazin's formula for the mean velocity, but there is every reason to believe it must be nearly correct.

4. It is quite clear that the formula $A \times 100 \sqrt{RS}$ is inapplicable for earth channels of moderate depth. Darcy and experiments proved conclusively that the co-efficient varies very much according to the nature of the sides and bed of a channel, and from their results and other observations and experiments Kutter and Ganguillet deduced a formula for mean velocity of channels and which appears to give a much more nearly correct estimate generally than any other yet published. The formula is $V = C \times (RS)^{\frac{1}{2}}$ for metrical

measures, when R = hydraulic mean depth S = sine of surface slope and $C = \frac{23 + \frac{1}{F} + \frac{.00155}{S}}{1 + (23 + \frac{.00155}{S}) F}$ where f is a co-efficient of friction varying from .01 for very smooth plastered channels or glazed

pies to .035 for rivers and canals with earthen beds in bad order and regimen and having large

quantities of stones and weeds. For English measures $C = \frac{23 + \frac{1}{F} + \frac{.00155}{S}}{1 + (23 + \frac{.00155}{S}) F}$. The co-efficient

of friction given by the authors of this formula appears too low for ordinary irrigation channels of moderate size. From the gaugings of the south main channel a value of $C = 40.4$ is arrived at for a hydraulic mean depth 4.7 and surface fall $\frac{1}{7200}$. This gives a co-efficient of friction = .05 and calculating from the formula with this co-efficient; the co-efficient C for the Strviguntum main channels allowing surface fall $\frac{1}{7200}$ will be—

For hydraulic mean depth ...	... = 1, C = 24
Do. do. ...	... = 1.5, C = 28
Do. do. ...	... = 2, C = 31
Do. do. ...	... = 2.5, C = 33
Do. do. ...	... = 3.0, C = 35
Do. do. ...	... = 3.5, C = 37
Do. do. ...	... = 4.0, C = 38
Do. do. ...	... = 4.5, C = 40

5. The following table shows the width as far as it can be calculated which ought to be given to the south channel that it may draw off five-ninth of the water reaching the anicut. The calculations are made for each foot of depth from 2 feet up to anicut crest level; 1° on the supposition that the head sluice is unaltered, 2° on the supposition that three vents are added to it. The depth which the south channel will require is limited to 5½ feet or 5¾ feet as we cannot run it deeper without flooding a large area of nunjah. It would be of course possible to bund this round and drain it by a syphon under the channel, but the cost would be quite disproportionate to any possible advantage:—

Depth in River at Anicut.	Depth in North Main Channel co-efficient of Head Sluice = .8.	Discharge.	For North Main Channel Column 3.	Depth in South Main Channel co-efficient of Head Sluice = .9.	Required bottom width.	Depth in South Main Channel with Head Sluice of 6 vents.	Required bottom width.
1	2	3	4	5	6	7	8
2	2	51	64	1.87	52	2.0	42
3	2.9	109	136	2.7	53	2.9	45
4	3.9	185	231	3.5	55	3.87	45
5	4.8	286	357	4.2	61	4.8	46
6	5.75	403	504	4.8	65	5.75	47
(= crest level)							
Mean	...	...	...	...	57	...	45

NOTE.—The co-efficient for north head sluice is taken at .8 as the masonry is dressed fair on the face for only 2 inches round the joints and the rest left rough.

The following are approximate estimates—(1) of the cost of widening the channel to 57 feet bottom width and (2) of widening it to 45 feet and adding three vents to the head sluice. The vents of both sluices are now all 4 feet wide and 8 feet high.

Proceedings of the Madras Government, Public Works Department,
31st March 1877. No. 1,094.

Estimate for widening south main channel to 57 feet bottom width or 21 feet more than present width.

Quantity.	Description of Work.	Rate.	Amount.
C. YDS.		RS. A. P.	RS. A. P.
171,500	Earth	0 1 3	13,398 7 0
1,833 1/2	Removing and rebuilding pitching	0 10 0	1,145 13 4
275	Rough stone pitching to raise to 6 1/2 above bed	2 0 0	550 0 0
611 1/2	Broken stone backing	1 8 0	916 12 0
233 1/2	Widening flooring to 57 feet	2 0 0	466 10 4
	Rock excavation in 3rd mile and pitching near masonry works		2,000 0 0
	Returns to head sluice wings		400 0 0
	Sundries and Contingencies		822 5 4
	Superintendence		400 0 0
	Total		20,100 0 0

Estimate for widening south main channel to 45 feet and adding three vents to the head sluice.

Quantity.	Description of Work.	Rate.	Amount.
C. YDS.		RS. A. P.	RS. A. P.
63,000	Earth	0 1 3	4,921 14 0
916 1/2	Removing and rebuilding	0 10 0	572 14 8
275	New pitching	2 0 0	550 0 0
396 1/2	Broken stone backing	1 8 0	595 2 0
100	Widening flooring to 45 feet	2 0 0	200 0 0
	Rock excavation in 3rd mile		700 0 0
	Sundries and Contingencies		560 1 4
	Superintendence		200 0 0
	Adding three vents		8,300 0 0
	Temporary bridge		6,500 0 0
	Superintendence		150 0 0
	Total		15,100 0 0

6. Besides the excess on cost the other objections to widening the channel to 57 feet. The berms were originally made wide, but the bunds and spoil banks have been washed down a good deal, and if the channel widened 21 feet, there would be practically no berm left, and there would also be much difficulty in many places in finding a place to put the large quantity of spoil. These objections would exist but in a slight degree in cases the channel be widened only 9 feet. It would be better to add three vents to the head sluice and widen the channel 9 feet than to add a less number of new vents added would not greatly affect the cost of the alteration to the sluice would consider that of building new wings, and the number of vents added would not greatly affect the estimate: and it would be no advantage worth considering to add more than three vents, as whatever the number the width of channel would have to be about 45 feet to discharge the required amount with moderate depths in the river.

Proceedings of the Madras Government, Public Works Department,
31st March 1877. No. 1,094.

so that water can be retained to the top of dam stones of calingulahs, the capacity will become 89 millions cubic feet or 42,200 cubic feet per acre of cultivation. This is equivalent to 32 days' supply at 1,300 cubic feet per acre per day. If the improvements proposed to channel and tanks be carried out, it will take (allowing 20 cubic feet per second for loss and supply of Sathukavothan tank and 35 cubic feet drawn off for cultivation under channel and tanks) 9 1/2 days for the channel running full to fill the tanks.

The cost of improvements to channel will be approximately as follows:—

Quantity.	Description of Works.	Rate.	Amount.
C. YDS.		RS. A. P.	RS. A. P.
43,300	Earth	0 1 0	2,707 12 0
	Altering two bridges	300 0 0	600 0 0
	Altering aqueduct, providing flooring, &c.		1,200 0 0
	Sundries pitching, &c.		492 4 0
	Superintendence		200 0 0
			5,200 0 0
	Deduct saving of up-keep of temporary dam, Rupees 390 capitalized		7,800 0 0
	Saving		2,600 0 0

The small quantity of water which will be lost by closing the old head sluice is to be considered, but on the whole it is believed that the improvements proposed would result in positive gain.

PALAMCOTTAH,
26th December 1877.

(Signed) W. HUGHES,

Asst. Engr., Tinnevely Dn. Officer.

(True Copy)

(Signed) J. D. GRANT,

Off. District Engineer, Tinnevely.

No. 11—W.

No. 779-A.

Note by the Chief Engineer for Irrigation.

The insufficiency of the water-supply for the irrigation under the Striviguntum ancient south main channel has been the ground of frequent complaints on the part of the ryots, and these complaints have taken the form either of remonstrances by the former holders of wet lands against allowing any water being passed down to the channels and tanks below the Kadamba tank, or of petitions by the ryots who have taken up fresh land in the belief that water would be available in proportion to the acreage to be irrigated.

2. It appeared to the undersigned that the ryots who held irrigated lands before the construction of the ancient, whose supply had been more or less interfered with by the new arrangements, had a fair claim to be first adequately supplied, and instructions to this end have from time to time been issued. The practical difficulty in effecting an equitable distribution however has arisen from the fact that the quantity of water available in any month is extremely uncertain, and without some reasonable basis for calculation it has been impossible to decide when, for instance, the supply in the Kadamba tank, an important reservoir at the lower end of the south main channel could be deemed sufficient for the cultivation under it, and what level of the water therein might be assumed to afford a sufficient reserve to avoid risk of the exhaustion of the supply before fresh-water from the river or from rain-

From June 1873 to April 1874 the water was over the crest of
anicut

May 1875 to April 1876 probably	...	...	...	...	...	56
---------------------------------	-----	-----	-----	-----	-----	----

... ..	...	...	...	...	...	24
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The registers for this last year are incomplete, that for November having been lost; seven days are however corrected for that month. The season was a very bad one, but the others may be taken as average ones. Taking the full depth of the south channel at $5\frac{1}{2}$ feet, the extra quantity of water which can be drawn off from the river during the year, if the proposed improvements be carried out, may be taken as the difference in its discharge with width 36 feet and with width 45 feet for 60 days or $60 \times 24 \times 60 \times (413 - 332) = 419.9$ millions cubic feet, or about half the tank capacity on the south bank. It should be mentioned that the south channel has never been excavated to the proper depth in the latter half of the 3rd mile. There is a good deal of rock there varying up to $1\frac{1}{2}$ feet above proper bed-level, and this reduces the surface fall in the first $2\frac{1}{2}$ miles, generally to about a foot a mile. This, however, does not make so great a difference in the quantity of water drawn off from the river as would at first appear; an estimate was made last year for excavating the rock, but it has not been yet sanctioned. The calculations made above all presuppose that the bed slope is as designed with a fall of $1\frac{1}{2}$ feet per mile.

Arthur Channel.

The ayacut area under Ahtur channel and under tanks

The tanks have been neglected in a great measure and does not allow of them holding more than 64

... 2,111

for several years, and the state of the bunds
billions cubic feet but by repairing the bunds,

* Dubuat's.

surface falls prevalent in the northern delta the observed velocities, and for the much channels there is no extended experience to as probable without further investigation the widely differing from the fact as is indicated memorandum. He shows, paragraph 5, the width of 45 feet and a depth of $5\frac{3}{4}$ feet would not have stated all the data, but it has been

the side slopes of the channel are

surface fall 1 in 3,960 or 16

hydraulic mean depth 4.7 feet

and in that case Dubuat's formula would give a mean velocity of 3 feet a second. It would make the velocity only 1.65 feet a second, and the latter does not agree with the channel of this size with so considerable a discharge upon observations given in paragraph 3 of the report. No water is not given, but as the sectional area of the river were made is greater than that of the intake, the water is presumed to have been of greater velocity.

e a discharge of 915 cubic feet a second
 to be noticed that the smaller discharge
 pond or 1,985 yards an hour equal to $1\frac{1}{2}$
 the experience of the undersigned on a
 all. Taking again the calculations based
 the memorandum: The actual depth of
 a of the channel where the observations
 ded enlarged section with $5\frac{3}{4}$ feet depth,
 ater depth; but then it is not clear how a

hydraulic mean depth closely corresponding to that of the enlarged channel was obtained, though this is quite possible. The observed maximum velocity was 1.714 feet only, and the mean velocity deduced was 1.0675 feet. By Dubuat's formula, with the surface slope of $\frac{1}{7200}$ stated, the mean velocity would be 2.18 nearly, or more than double that shown from observation. The surface fall in this case is more nearly that of the canals in the northern deltas, though still considerably greater, and the results of the observations therefore must be considered open to serious doubt.

Roorkee Professional Papers, No. 18-A.

A perusal of Captain Alan Cunningham's experimental researches at the Solani aqueduct on the Ganges canal shows how very carefully observations must be made, and how variable are the velocities even in a channel of perfectly regular section and with masonry floor and sides. Consequently too much reliance must not be placed on the few and comparatively rough observations on the south main channel. The sectional area of waterway and the small surface slope would appear to indicate that the conditions of the channel at the place chosen for experiment were abnormal, and if so, the results may have been seriously affected.

5. Fortunately it is not necessary to base proposed action on either observations or formula in this case. The channel carries much too little water, and it does not utilize what water there is in the river. The extent to which it can be conveniently widened is limited by the spoil banks. Two proposals have been made: one to add three vents of 4 feet to the head sluice, and the approximate estimate for this is Rupees 15,100; the other to leave the head sluice as it is, and to widen the channel to a bottom width of 57 feet to compensate for the loss of head at the sluice, the estimate for this being Rupees 20,100. Independently of the difference of cost, the former arrangement will be in every way preferable; the sluice is known to be small, and had it not been built before the project was sanctioned it would have been made larger. Loss of head here means loss of water, for the proper head could not be obtained without water going over the anicut. It may be however better in the way to add two vents of 6 feet instead of three of 4 feet to the head sluice, making a height of the vents 6 feet instead of 8 feet, which will be sufficient; the alteration will then fit the channel better, have a slightly greater discharge, and cost less.

6. It is necessary to notice that the practical value of Mr. Hughes' memorandum is much lessened by the absence of information as to all the data from which his conclusions have been drawn. Every bearing on the subject should have been clearly set forth, and though the undersigned has made some use of the information given, no one unacquainted with the facts could deal with it at all.

7. By the alterations proposed additional area are expected to be utilized, and the quantity of water required for from 2,000 to 2,500 acres. Inasmuch as it will secure a sufficient supply for a larger area, and do much to remove

420 millions of cubic feet of water additional quantity would represent the entire supply for the village, however, be really much more valuable, instead of an inadequate supply to a much larger area, and do much to remove the disappointment which has been felt at the

want of success hitherto of the project as a means of irrigation. It will probably be safe to assume that the outlay will be covered by increase of revenue in two or in three years at the outside.

8. The District Engineer also remarks upon the Ahtur channel, one of the principal distributaries from the main channel. The original arrangements were certainly very faulty, especially as regards the totally inadequate waterway of the bridges. This was noticed in 1869.

Notes of Inspection, 27th November 1869, paragraph 14, with G.O., No. 198, 18th January 1870.

These bridges (two) have a waterway of 10 feet only against a present mean waterway of channel of $19\frac{1}{2}$ feet, while it is shown to be necessary to make the mean width of the latter $25\frac{1}{2}$ feet, at the same time increasing the surface fall. The new Ahtur channel crosses the old source of supply from a head on the river some miles below the anicut by an aqueduct, and in consequence of representations made the undersigned authorized the dropping of

No. 53 T.N., 23rd November 1876.

the water over the side of the aqueduct into the old channel, and this alteration increased the supply materially, and is reported to have saved the land under cultivation last season. The cost of the improvements recommended by the District Engineer is approximately estimated at Rupees 7,800 and it is stated that thereby an annual outlay of Rupees 390 on the maintenance of the old head will be saved. This had better not be taken into account at present for it may be found desirable to use the double source of supply whenever the state of the river is favorable to the offtake of water at the old head.

9. The approximate estimate for enlarging the head sluice of and widening the south main channel may be approved pending the submission of a regular estimate, and it is recommended that authority be given for preparing materials for the sluice, while the enlargement of the channel to 45 feet bottom width may, it is considered, at once be undertaken as the most valuable work on which a portion of the famine relief labor understood to be available can be employed.

10. A regular estimate for the improvement of the Ahtur channel should be prepared for entry in the Budget of 1878-79. It would perhaps be premature to carry out the enlargement until the main channel has been improved and the water-supply increased and until the general effect of these alterations has been ascertained, but if famine relief labor should need employment the widening of the Ahtur channel may be undertaken earlier, and in any case the regular estimate should not be delayed.

11. There are very special grounds for urging that more than ordinary care should be taken in the case of this project to secure to the people as much water as the Tambrapoorny will supply. They have paid considerable sums of money for the right of occupation of lands formerly near valueless, in the belief that water was about to be made available, and they have suffered loss owing to that water not being forthcoming. The ideas formerly entertained about the value of the Tambrapoorny as a source of irrigation were undoubtedly very sanguine, the difference between the circumstances of this lower anicut and of those situated higher up the river having been too little considered. The seasons have been exceptionally bad for the last two

have had their expectations falsified to a very
 beyond their own control.

FORT ST. GEORGE,
13th March 1877.

(Signed)

JOHN MULLINS, Lieut.-Col., R.E.,
Chief Engineer for Irrigation.

No. 780.

ORDER THER

st March 1877, No. 1,094.

IRRIGATION, No. 51-A.

of the irrigation under the Strivi, noticed, and the enlargement of the channel with a view to secure a better supply of water which would be of great benefit to the lands under this channel.

2. Imperfections in the design
sanguine estimate of the value of the
disappointment, and the result of the
which was anticipated when the sch

3. There has existed considerable doubt as to the probable future revenue from the proposed irrigation, and the latest Proceeding of the Public Works Commission is in accordance with this view.

Public Works Department, No. 52, 6th
1877.

In the papers submitted by the Chief Engineer for Irrigation certain prominent defects in the arrangements for the supply of water to the ancient south main channel have been pointed out and it has been recommended that its head sluice has been recommissioned and of its head sluice has been recommissioned and prevent the loss over the great value to the inadequately supplied

arrangement of the works and an over-
-poorness as a source of supply have led to
as so far has been widely different from that
as submitted for sanction.

ference of opinion among Revenue Officers which may be expected from this system of the Revenue Department on the subject are those of the 21st February last, No. 754.

Inadequate water-supply is clearly the great difficulty. With that increased, irrigation will certainly be extended and more water it may be anticipated that even such results as have been attained may

6. The District Engineer should take care in forwarding the estimates to show.

2nd.— Whether any part of the Budget provision for 1877-78 can be transferred to these improvements, and what sum in addition will be required.

(True Extract.)

Lieut.-Col., R.E.,

Secretary to Government, P.W.D.

To the District Engineer, Tinnevely.

„ Chief Engineer for Irrigation.

„ Examiner of Public Works Accounts.

Revenue Department.

„ Superintending Engineer, Godavery.

97 97 97 Kistna.

Exd. A. Grubert.

Revenue Department
No 2177

2233

Govt. of Madras

PUBLIC WORKS.

To

THE DISTRICT ENGINEER,
TINNEVELLY.

Dated March 31st.

Issued

Recd. 18 April 77

G. O. 31st March 1877, No. 1

Dr. Mr.

MARCH.

Nos. 779-780.

Stringent Amount South Main Channel,
Tamil District. - Passing orders on
Note by the Chief Engineer for irrigation
regarding the main water supply
under the

No 2233

Comd. to the
Board of Revenue

12. To the W. of Revenue 20-4-77