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TAMIL NADU ARCHIVES

GOVERNMENT OF TAMIL NADU

Revenue

DEPARTMENT

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GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

17th August 1877, No. 238 I.

Irrigation.

Account.

Read the following papers :—

No. 53. From Major J. BEATTY, R.E., Officiating Superintending Engineer, Godavery, to the Chief Engineer for Irrigation, dated Camp Dowlaishweram, 15th June 1877, No. 857.

I HAVE the honor to submit, herewith, a comparative statement showing the original and revised estimates of Nursapur canal, accompanied by fourteen plans, twelve estimates, and a full report by the Divisional Officer.

14 Plans } as per list attached to the Range
12 Estimates } Officer's report.
1 Comparative statement.
1 Range Officer's report No. 122 of 30th May 1877.

28 *sent by Banghy.

* Rupees 9,138.
† Rupees 14,206.

estimated amounts to Rupees 2,12,780, being in excess of the former estimate by Rupees 3,180, or about $1\frac{1}{2}$ per cent. of the original sanction.

2. The original estimate amounted to Rupees 2,09,600; the revised estimate from which it is proposed to omit seven items* of the original estimate as not required or otherwise provided for and to include fifteen works† not previously

3. The Divisional Officer requests early sanction to the revised estimate or authority to collect materials for the Marter lock and weir, the Chinchinnada channel head sluice and drop, and the under tunnel at $3\frac{1}{4}$ miles to enable him to commence building at the close of the present irrigation season.

From Lieutenant A. R. F. DORWARD, R.E., Assistant Engineer, in charge Western Delta Division, to Major J. BEATTY, R.E., Officiating Superintending Engineer, Godavery District, dated Camp, Thadipalligudem, 30th May 1877, No. 122.

I HAVE the honor to forward, herewith, a revised estimate of Rupees 2,12,780 for Nursapur canal improvements. The original estimate amounted to Rupees 2,09,600; the revised estimate therefore exceeds the original by Rupees 3,180. This excess is due to the provision now made for several works that are much wanted, but were not allowed for in the original estimate. Were only the works allowed for in that estimate to be carried out there would be a large saving.

2. *Main Canals and Branches, B. Land.*—I have made no change in the amount originally allowed for compensation for land. That amount will probably prove sufficient both for land taken up by the canal itself and for land taken up by distributaries. I have not therefore included in the revised estimate the Rupees 900 sanctioned in addition to the general grant of Rupees 3,820 for compensation for land for Afsanta new channel in G.O. of 14th May 1875. No. 1,374. If it be wished to show land compensation for the canal and its distributaries separately, the provision of Rupees 3,820 can be divided into Rupees 1,820 for the canal and Rupees 2,000 for distributaries.

3. *E. (1). Other Cross Drainage Works.*—A plan and estimate of Rupees 7,000 for an under tunnel at 37½ miles of the canal (measuring from Vijeswaram head sluice) is forwarded herewith. This under tunnel will be a very useful work, and will provide for the drainage of 3,400 acres of land, which at present may be said to have no means of drainage whatever. The necessity of the work is recognized in paragraph 56 of the Notes of Inspection of the Chief Engineer for Irrigation embodied in G.O. of 15th July 1874, No. 1,906. It will be seen from the survey (on tracing cloth) that the level of the tract to be drained is generally but little above level throughout the greater part of the wet season, and sometimes for a month at a time. As the drain has no left bank, its waters flow over the whole tract shown in the survey, and if a left bank be not provided, it will be of little use building the under tunnel which would be principally occupied in passing water brought down by the drain. A left bank was provided for in the revised estimate for the drain west of Nursapur canal forwarded with my No. 234 of 4th October 1876. When the land is drained, it will be immediately cultivated. About half of it is so at present, but as may be imagined with little profit. Much of the land is "Mamaipallam" which accounts for the ryots accepting the risk of cultivation.

The under tunnel will discharge into the Madavapalem drain, which passes into the river through the self-acting outfall sluice under the Chinchinnada road. The depth of water in the canal over the tunnel will vary from 4½ to 6 feet.

4. *H. Escapes.*—The surplus weir at the end of the canal at Mogultur has been finished at a cost of Rupees 2,864. It was built on a revised estimate of Rupees 2,670 sanctioned by the Chief Engineer for Irrigation in his No. 810 of 10th October 1874. The discharging capacity of the weir is insufficient, there being no means of surplussing water out of the canal between it and Peravelli. It will some day be advisable to build a surplus weir near Kavitam.

5. *I. Navigation.*—The locks and lock weirs at Peravelli and Itempudi have been completed. A revised plan and estimate of Rupees 19,040 (original estimate, Rupees 21,400) for Marter lock is forwarded herewith. The accompanying survey will show the arrangements proposed near this lock. They are those explained in my No. 53 of 24th April 1876, and generally approved, subject to the extra cost entailed by them not exceeding Rupees 4,500, by the Chief Engineer for Irrigation in his Memorandum No. 62 G.D. of 16th June 1876. It will be seen from the accompanying estimates that the extra cost of placing the new lock above instead of below the present one is Rupees 2,920, made up of Rupees 1,570 for the Chinchinnada channel head sluice, of Rupees 1,050 for a drop in Chinchinnada channel, and of Rupees 300 for improvements to the lock weir channel. The first two items come under "Distributaries, C. Works," and will be remarked on under that head.

Referring to paragraph 6 of the Memorandum No. 62 G.D. of the Chief Engineer for Irrigation, I may state that the Rupees 300 mentioned in paragraph 3 of my letter did refer to cost of clearance above site B.

The design now submitted for the Marter lock shows two small culverts on each side discharging into the rear bay. This arrangement is similar to that adopted at Palkole lock, and is not a good one, as only the down stream vent discharges properly. The rush of water along the side culvert passes the first vent without using it. It will be better in building Marter lock to make one large opening only on each side. By building the two outlet culverts in a direction oblique to the side culvert the water rushing along that culvert might be induced to use both the outlet vents about equally, but the less commotion that would thereby be caused would be partly nullified by the centre of commotion, the meeting point of the streams issuing from the outlet vents into the rear bay on opposite sides of the lock, being thrown towards the end of the rear bay.

No change has been made in the sanctioned estimate for the Marter lock weir.

The Kavitam lock has been built with a saving of Rupees 1,478. I have not altered the provision of Rupees 1,070 for fitting the existing lock weir with screw gearing. It will probably prove ample to render the work fairly efficient. The weir is inconveniently close to the canal.

The Palkole lock has been finished, except 22 running feet of bridge parapet coping with a saving of Rupees 3,570 on the original estimate. The lock weir has also been finished.

The tidal lock at Mogultur has been built for Rupees 29,750 on a revised estimate of Rupees 30,000, sanctioned by the District Engineer.

6. *L. Earthworks.*—The extension of the canal to Mogultur has been completed at a cost of Rupees 19,322, being in excess of the original provision of Rupees 18,500 by Rupees 822. The excess was due to no provision for baling or for excavating the surplus weir channel having been made in the original estimate.

I have entered a provision of Rupees 300 for improvements to the Marter lock weir channel. The improvement proposed to be carried out is marked on the survey plan of Marter lock site.

7. *Distributaries.*—As on almost all of this Delta canals the provision for masonry works of distributaries is most inadequate, and it must be largely increased.

Vipparru Channel.—A plan and estimate for the Vipparru channel head sluice is forwarded herewith. The original provision for this sluice was Rupees 700. The present estimate amounts to Rupees 820.

Two drops (called dams in the sanctioned estimate) are required on this channel. At present the water is dropped over two boulder stone dams. These temporary works admit of only the roughest kind of water regulation, and their stones require constant repacking. The substitution of permanent drops is therefore advisable. I have increased the provision for these two works from Rupees 160 to Rupees 500, the former sum being totally inadequate.

Rapaka Channel.—In the original estimate there is a provision of Rupees 750 for a head sluice to Rapaka channel. The sluice has to pass water for the irrigation of 10,000 acres, and a work to do this efficiently certainly cannot be built for anything like Rupees 750, except under peculiarly favorable circumstances which do not here exist.

I have been in doubt as to whether a sluice or a weir is more suited to the circumstances of this work, and have finally preferred a weir, for which I forward a plan and estimate of Rs. 2,450. The difference of water level in the canal and channel is about 7 feet. The commotion in rear of a sluice would therefore be violent and would necessitate long wings and revetments, and long revetments entail considerable cost of maintenance. By dropping the water over a weir, the velocity in rear can be considerably reduced. From this point of view the advantages are all in favor of a weir. It has to be remembered however that during the irrigation season we have to deal with considerable variations of water level in canals, and a diminution of water level affects a sluice less than a weir. On some of our canals where regulating weirs are few, a sluice would be certainly preferable to a weir. On the Nursapur canal, however, owing to the numerous lock weirs the levels of the various reaches can be raised at will and in turn. Full supply can therefore occasionally be sent down the various channels, and a period of scarcity of water tided over. In the present case the ordinary full supply level of the canal at Rapaka channel head is + 24.34. The maximum supply level is about 9 inches higher.

The Itempudi lock weir presents the canal level ever falling much below + 24, and at that level the weir will discharge 20,000 cubic yards per hour, or 2 cubic yards per hour per acre to be supplied. I have no doubt that the weir will prove an efficient regulator. Its cost is probably rather less than what a sluice would cost, and its maintenance will certainly cost less.

Ogidi Sluice.—This sluice has to supply three channels, all at different levels. To build a sluice capable of doing this satisfactorily for Rupees 450, the provision made in the original estimate is impossible.

I forward herewith a plan and estimate of Rupees 1,350 for the work.

Two channels have to be dug from this sluice, one running north to irrigate land at present irrigated by palmyra spouts in the canal bank, the other running south to pick up the head of the Palkole old channel No. 1 at present inefficiently supplied by an old sluice built in the canal bank below Itempudi lock. At the head of Palkole old channel No. 1 there is a branch running south. This branch has its bed at a higher level than that of Palkole old channel No. 1, and is now supplied partly by that channel sluice and partly by palmyra spouts in the canal bank. In the proposed arrangements this branch will be a continuation of the new channel running south from Ogidi sluice. A provision of Rupees 150 has been made for a dividing dam at the head of Palkole old channel No. 1. A dam is also allowed for in the original estimate. These dividing dams are simple inexpensive works answering their purpose very well.

Provisions of Rupees 215 and Rupees 464 were made in the original estimate for the channels to run north and south from Ogidi sluice respectively. Longitudinal sections of these channels are now forwarded together with revised estimates of Rupees 600 and Rupees 240.

An under tunnel has been built at a cost of Rupees 672 under Palkole old channel No. 1. The original provision for this work was Rupees 600. It was built on a revised estimate of Rupees 670 sanctioned by the District Engineer.

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Cherukuvada Channel.—Rupees 80 were allowed in the original estimate for a dam across Cherukuvada channel. No dam is required, and the provision has not been entered in the revised estimate.

Atsanta New Channel.—An estimate of Rupees 5,250 was sanctioned for Atsanta new channel in G.O. of 14th May 1875, No. 1,374. The estimate was made up as follows:—

Compensation for land	Rs
Masonry works	900
Earthworks	950
	3,400
Total	5,250

The item for compensation for land has been already mentioned under "Main Canals and Branches, B. Land."

The channel has been completed, the earthwork costing Rupees 3,075, and the masonry Rupees 990.

Palkole Old Channel No. 2.—The provision of Rupees 200 for a head sluice to Palkole old channel No. 2 has been increased to Rupees 450.

Villur Channel.—The Villur channel head sluice has been built for Rupees 477 against a provision of Rupees 400.

Chinchinnada Channel.—If Marter lock be built above its present site, it will, as has already been explained in my No. 53 of 24th April 1876, be necessary to rebuild Chinchinnada channel at a higher level than the Chinchinnada channel close along the right bank of that channel. The Chief Engineer for Irrigation in his Memorandum No. 62 G.D., of 16th June 1876, proposes supplying the Neggipudi channel from a separate vent in the Chinchinnada channel new head sluice. This, owing to there being no room between the village houses and the Nursapur canal road (see survey of Marter lock site) for a channel from the sluice to the present head of Neggipudi channel, cannot be done unless the houses be removed. The houses are of a superior kind, and their owners would probably object to their removal and certainly claim a large sum as compensation for them and the ground on which they stand. I have therefore designed the Chinchinnada channel head sluice of sufficient capacity to supply water to the land irrigated by both channels. A drop at 1½ miles on the Chinchinnada channel, close to where the Neggipudi channel ends, will keep the water above it at a level sufficient to irrigate the high land now supplied by the Neggipudi channel. The land now occupied by that channel can be then given out for cultivation, and there will be no future expenditure on the up-keep of the channel.

An under tunnel to drain 607 acres of land is required on Chinchinnada channel about half a mile south of the road from Palkole to Doddipatta. It was not allowed for in the original estimate, but Rupees 700 are now provided for it. At the site of the tunnel the left bank of the channel is the right bank of the Nakkala. If that drain outfall sluice be built at the place I have proposed in my No. 390 of 21st December 1876, forwarding the bank canal revised estimate, the Chinchinnada channel can be ended at the site of the tunnel which will not then be required. The provision can then be applied to building an infall sluice to carry the drainage of the 607 acres into the Nakkala.

There is a provision, which is not required, of Rupees 175 for a dam across Chinchinnada channel in the original estimate. That provision has now been omitted.

The Medapad branch of the Chinchinnada channel has been dug at a cost of Rupees 772 against a provision of Rupees 600. Two under tunnels are required on this branch, one about 600 yards north of the Doddipatta road to drain about 300 acres of land, and the other south of the road where the channel crosses an old drain called Chintalagunta chedi. The drainage area of the second tunnel will be about 700 acres. Neither of these tunnels was allowed for in the original estimate, but both are very necessary works, and it would have been well had they been carried out when the Medapad branch was dug. Rupees 1,300 are now entered in the revised estimate for them.

Jinnur Channel.—In the original estimate there is a provision of Rupees 880 for a tunnel under the Jinnur channel in the 10th mile. It is not required as the land it was intended to drain is now provided for by the drain west of Nursapur canal. It seems to have been intended to pass water under Jinnur channel into the Baggeswaram drain, the water level of which is generally higher than that of the drain west of Nursapur canal. The provision has been left out of the present estimate.

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The earthwork improvements to Jinnur channel have been completed for Rupees 932, the provision being Rupees 1,320.

Mattapurru Channel.—The two dams allowed for on this channel have been built. They are dividing dams.

Konter Channel.—In the original estimates Rupees 750 were allowed for a head sluice and dam to this channel, and Rupees 1,293 for improving and extending the channel. These were among the earliest completion project works carried out, and their accounts are not clear.

The total cost of the works including an extra dam (on what sanction built I do not know) was Rupees 1,957, or Rupees 86 less than the original provision. The accounts of the separate works are mixed up together, and I have assumed that the saving has taken place on the earthworks.

To carry this channel over the Palkole Ava drain, a branch of the Kaza drain, an aqueduct is required. At present temporary arrangements are in use. The aqueduct will have to pass the drainage of rather more than 1,000 acres. Rupees 600 have now been allowed for this work which was not allowed for in the original estimates.

Puvalapalli Channel.—Rupees 400 have been provided for a head sluice to this channel which at present has none.

Palkole Old Channel No. 3.—A plan and estimate of Rupees 480 for a head sluice for Palkole old channel No. 3 is forwarded herewith. The present sluice is an old brickwork, past falling to pieces and of insufficient discharging capacity. The sluice will be built in the right bank of the tank through which the canal passes above Palkole lock. The tank-bed is considerably above the Palkole lock upper sill, and the sluice sill has been placed at one foot above that level. There is nothing to be gained by placing it lower.

A dam has been built for Rupees 111 on this channel on an estimate sanctioned by the District Engineer.

Digamaru Channel.—This channel head sluice has cost Rupees 944, the original provision being Rupees 750. A revised estimate of Rupees 923 was sanctioned in G.O., No. 2,653, of 17th September 1874, and the excess of Rupees 21 on that sanction was passed by the District Engineer in his No. 3,465, of 9th February 1875.

The dividing dam at the head of the Chittavaram branch has been built for Rupees 120, the provision being Rupees 150.

The earthwork improvements of the Digamaru channel have been carried out for Rupees 1,946, showing a small excess over the provision of Rupees 1,905.

Gorintada Channel.—This channel requires a new head sluice and an under tunnel to pass the drainage of about 800 acres.

Saripalli Channel.—Similar works are required for the Saripalli channel, the existing head sluice of which is in very bad order.

Under tunnels for these two channels were not allowed for in the original estimate.

Navarasapuram Channel.—About eight years ago a tunnel to pass the drainage of about 100 acres was built under this channel by ryots. The tunnel is falling down. Rupees 300 are now provided in the revised estimate for its renewal.

Rustambada and Kopparru Channels.—Both these channels require head sluices and aqueducts to carry them over the Rustambada drain. The original provision of Rupees 750 for these two aqueducts has now been raised to Rupees 1,100.

Mogultur Channel.—This channel has no head sluice. Rupees 400 are now provided for one.

Latchmeswaram Channel.—There was a provision of Rupees 1,520 for excavating this channel and building a head sluice. Both these works have been completed, there being a considerable saving on the earthwork provision.

Vemuldevi Channel.—Mr. Randall proposed carrying a channel across the salt creek that runs from the Upputer just below Mogultur tidal lock eastward to the Godavery for the irrigation of Vemuldevi lands. He proposed extending the existing Nursapur channel, which has its head in the left bank of the canal just below Nursapur town. The extension was to run

close to the river, and would have crossed the salt creek at its junction with the Godavery, east of the Linaganaboyanacherla salt-pans. Some years ago the Salt Department deepened the creek and made it navigable. Now there is considerable traffic on it between the salt-pans and the river. A channel could not be carried over the creek without stopping this traffic which the late Salt Deputy Collector considered, and rightly, I think, would seriously interfere with the prosperity of the pans. An under tunnel to carry irrigation water under the creek would be an expensive work, too expensive to allow of its adoption for the irrigation of about 1,500 acres. For other reasons also I do not consider Mr. Randall's proposal feasible.

The Nursapur channel is about $1\frac{1}{2}$ miles long. It runs through light sandy soil with a bed-fall of 9 inches per mile, depth of water being $2\frac{1}{2}$ feet, and is continually getting choked up with sand. It is kept in working order only with the greatest difficulty. At its end the level of the land is between +1 and +2 (H.W.D.), and this is also about the level of the Vemuldevi water in the channel would not be more than 3 inches in a mile. The cost of a channel with this fall would be very much greater than Mr. Randall supposed. For 4 miles the left bank of the channel would be exposed to the wash of the river when in flood, and the channel would prevent any drainage getting to the river, blocking up the numerous small creeks now used for that purpose. Mr. Randall made no provision for cross drains. The channel would pass through light sandy soil on the Vemuldevi lanka, and with its low velocity I believe it would be impossible to keep it open.

Mr. Walsh began investigations for a channel to take off above Mogultur lock and pass over to the Vemuldevi lanka crossing the creek west of the salt-pans. These investigations I carried out far enough to satisfy myself that a channel so run would be enormously expensive, the creek being everywhere of great width, in the narrowest part about 400 yards. The cost of protective works to the high channel banks across the creek would, as lanka grass could not be used, be very great. The ground over which the channel would pass is very irregular and the soil generally light sand. Altogether I do not think it possible to irrigate the Vemuldevi lands, except at a cost that would be out of all proportion to the revenue that would be derived from the channel.

The cheapest line for the channel would be to place its head in the Ramannapalem salt canal and cross the creek through the centre of the pans. The Deputy Collector considered that a channel so carried would ruin the pans; but even were it certain that it would not injure them, I do not think it would be advisable to dig the channel. I have therefore omitted all provision for Vemuldevi channel in the revised estimate. The swamp land that will be brought under cultivation by the building of the tunnel under the canal at $37\frac{1}{2}$ miles will compensate for the Vemuldevi land, the irrigation of which was calculated on when the original project estimates were submitted.

Mogultur New Channel.—Mr. Randall also made a provision of Rupees 840 for a new channel and head sluice to irrigate Mogultur lands. This channel was to take off above Mogultur lock on the right side of the canal. The centre of the land he intended to irrigate is about $1\frac{1}{2}$ miles distant from the canal, and by far the greater portion of it is above canal full supply level. To irrigate by direct flow would be impossible, and the ryots would do very little baling, if any. They have much uncultivated land to which they could bale water which is available, but not taken advantage of. The provision of Rupees 840 has therefore been left out of the revised estimate.

Minor Sluices.—There are provisions aggregating Rupees 3,178 for "minor sluices" in the original estimate. In the revised estimate provisions have been specially made for all head sluices that are required.

8. The following items which appear in the original estimate do not properly belong to the Nursapur canal:—

(1.) Tunnel under Pekeru channel	...	...	...	...	Rs.
(2.) Peravelli west side channel head sluice	...	...	...	...	300
(3.) Dam across do.	...	...	...	...	150
(4.) Two dams across Peravelli east side channel	...	...	...	...	75
(5.) Tunnel under do.	...	...	...	...	150
	...	...	...	...	300

Total ... 1,035

The Pekeru channel is a branch of the Mukkamala canal, and does not require an under tunnel. The other four items represent works (that have all been built) belonging to channels under the Kakaraparru canal, and which should have appeared in the estimate for that canal.

9. *General Remarks.*—It is proposed to build the lock at Marter in this official year, and a provision for it has been made in the Budget. I would ask, therefore, that an early decision be come to as to the position of this lock, so that I may have time to collect materials for the work. If the proposals I have made regarding it are approved, it will be necessary at the same time to build the Chinchinnada channel head sluice and drop.

I hope also that I shall receive permission to build the under tunnel at $37\frac{1}{2}$ miles immediately after the present irrigation season. I look upon it as about the most urgently required work yet to be built in the range. There is no doubt that it will be a very remunerative one.

GODAVERY DELTA SYSTEM, WESTERN DELTA SECTION.
Comparative Statement showing the Original and Revised Estimates, NARSAPUR CANAL.

Main-head.	Sub-head.	ORIGINAL ESTIMATES.			REVISED ESTIMATES.			Remarks.
		Items.	Amount.	Total.	Items.	Amount.	Total.	
(2.) Main Canals and Branches.	B. Land ...	Compensation	RS. 3,820	3,820	Compensation	RS. 1,820	1,820	Plan and estimate forwarded
	F. (1) Other cross drainage works.	Sariyalli under-tunnel	...	...	Sariyalli under-tunnel	7,000	7,000	
	H. Escapes.	Surplus weir, Mogaltur	2,380	2,380	Surplus weir, Mogaltur	2,664	2,664	Built.
	I. Navigation.	Lock, Peravelli	21,390	...	Lock, Peravelli	19,415	...	Do.
		Do. weir, Peravelli...	6,640	...	Do. weir, do.	5,586	...	Do.
		Do. Itimpudi	21,640	...	Do. Itimpudi	21,812	...	Do.
		Do. weir, do.	5,076	...	Do. weir, do.	4,942	...	Do.
		Do. Marter	21,400	...	Do. Marter	19,110	...	Plan and estimate forwarded
		Do. weir, do. (alterations)	1,810	...	Do. weir, do. (alterations)	1,810	...	Built
		Do. Kavittam	24,160	...	Do. Kavittam	22,682	...	Built
		Do. weir, do. (alterations)	1,070	...	Do. weir, do. (alterations)	1,070	...	Built.
		Do. Palkole...	22,570	...	Do. Palkole	19,000	...	Do.
		Do. weir, do.	4,379	...	Do. weir, do.	3,881	...	Do.
		Do. Mogaltur (tidal)	29,850	...	Do. Mogaltur (tidal)	29,700	...	Do.
L. Earth-works.		Mogaltur extension	1,58,950	...	Mogaltur extension	19,322	1,48,558	Completed.
		Improvements, Marter lock weir channel.	18,500	...	Improvements, Marter lock weir channel.	300	19,622	
		Total, Main Canals and Branches	1,83,650	...	Total, Main Canals and Branches	...	1,79,664	

(3.) Distributaries.	B. Land ..	C. Works ...	ORIGINAL ESTIMATES.			REVISED ESTIMATES.			Remarks.
			Items.	Amount.	Total.	Items.	Amount.	Total.	
(3.) Distributaries.	B. Land ..	C. Works ...	Compensation	...	...	Compensation	...	...	Plan and estimate forwarded.
			Head sluice, Vipparru channel.	700	...	Head sluice, Vipparru channel.	820	1,992	Do.
			Two dams, Vipparru channel.	160	...	Two dams, Vipparru channel.	500	...	Do.
			Head sluice, Rapaka channel.	750	...	Head weir at Rapaka channel.	2,280	...	Do.
			Do., Ogidi do.	450	...	Head sluice, Ogidi channel...	1,350	...	Built.
			One dam, Ogidi do.	150	...	One dam, do.	150	...	Built. Sanctioned in G.O. No. 1,374, 14th May 1875.
			Under-tunnel, Palkole old channel, No. 1.	600	...	Under-tunnel, Palkole old channel, No. 1.	672	...	Do.
			One dam, Cherukivada channel.	80	...	Under-tunnel, Atsanta new channel.	990	...	Built. Plan and estimate forwarded.
			Head sluice, Palkole old channel, No. 2.	200	...	Head sluice, Palkole old channel, No. 2.	450	...	Do.
			Head sluice, Villur channel.	400	...	Head sluice, Villur channel.	477	...	Built. Plan and estimate forwarded.
			One dam, Chinchinnada channel.	175	...	Head sluice, Chinchinnada channel.	1,570	...	Do.
			Under-tunnel, Jinnur channel.	380	...	One drop, Chinchinnada channel.	1,055	...	Built.
			Two dams, Mattaparru channel.	400	...	Two under-tunnels, Medapad branch of Chinchinnada channel.	1,300	...	Completed. Cost of each work not separately shown in accounts.
			Head sluice, Kontur channel.	600	...	Two dams, Mattaparru channel.	280	...	Plan and estimate forwarded.
			One dam, do.	150	...	Head sluice, Kontur channel.	750	...	Built.
			Head sluice, Digamarru channel.	750	...	Two dams, do.	...	...	Do.

Comparative Statement showing the Original and Revised Estimates, NARSAPUR CANAL—(Continued).

ORIGINAL ESTIMATES.				REVISED ESTIMATES.				Remarks.
Main-head.	Sub-head.	Items.	Amount.	Total.	Items.	Amount.	Total.	
		One dam, Digamarru channel.	RS. 150	RS.	One dam, Digamarru channel.	RS. 120	RS.	Built.
					Head sluice, Gorintada channel.	480		Similar to sluice for Palkole old channel No. 3.
					One under-tunnel, Gorintada channel.	600		
					Head sluice, Saripalli channel.	480		Similar to sluice for Palkole old channel No. 3.
					One under-tunnel, Saripalli channel.	600		
					One under-tunnel, Navarasapuram channel.	300		
					Head sluice, Rustambada channel.	500		
		One aqueduct, Rustambada channel.	375		One under-tunnel, Rustambada channel.	500		
					Head sluice, Kopparru channel.	500		
		One aqueduct, Kopparru channel.	375		One under-tunnel, Kopparru channel.	600		Built.
					Head sluice, Mogultur channel.	400		Not to be built,
		Head sluice, Latchmeswarum channel.	200		Head sluice, Latchmeswarum channel.	212		Do.
		Head sluice, Venuldevi channel.	450			...		
		Head sluice, Mogultur new channel.	180			...		Provision made specially for each sluice required.
		Minor sluices	3,178			...		Not wanted.
		One under-tunnel, Pekkuru channel.	360			...		
				11,713			20,471	

11,713

L. Earth-works.	Head sluice, Peravelli west side channel.	Transferred to Kakrapur canal.	...	Built Rs. 165	48	Transferred to Kakrapur canal.
	One dam, Peravelli west side channel.	...	...	Do. "	63	raparru canal.
	Two dams, Peravelli east side channel.	...	...	Do. "	301	
	One under-tunnel, do. east side channel.	...	...	Do. "		
	North channel from Ogidi sluice.	North channel from Ogidi sluice.	600	Plan and estimate forwarded.		
	South channel from Ogidi sluice.	South channel from Ogidi sluice.	240	Do.		
	Atsanta new channel	Atsanta new channel	3,075	Completed. (Revised estimate sanctioned in G.O. No. 1,374, dated 14th May 1875.) Completed.		
	Villur channel, improvements.	Villur channel, improvements.	190	Do.		
	Medapad branch of Chindin-nada channel.	Medapad branch of Chindin-nada channel.	772	Do.		
	Jinnur channel, improvements.	Jinnur channel, improvements.	932	Do.		
	Konter channel, improvements.	Konter channel, improvements.	1,207	Do.		
	Digamarru channel, improvements.	Digamarru channel, improvements.	1,946	Do.		
	Vemuldevi channel ...	Vemuldevi channel ...	3,960	Not to be carried out, as construction of salt-pans has barred the only way in which the channel could have been taken at a reasonable cost.		
	Vemuldevi protective work at salt creek.	Vemuldevi protective work at salt creek.	350			
	Lutchmeswarum channel	Lutchmeswarum channel	1,320	Completed.		
	Mogultur new channel	Mogultur new channel	680	Not to be carried out, land too high.		
	Total, Distributaries ...	Total, Distributaries ...	13,562	9,273		
			25,275	31,736		

Comparative Statement showing the Original and Revised Estimates, NARSAPUR CANAL—(Continued).

Main-head.	Sub-head.	ORIGINAL ESTIMATES.		REVISED ESTIMATES.		Remarks.
		Item.	Amount.	Item.	Amount.	
(4).—Drainage and Protective Works.	C. Works ...		RS.	Outfall sluice into Nakkala just below end of Chinchinada channel.	RS. 700	
		Grand Total ...	RS. 2,08,925	Grand Total, Revised Estimates.	2,12,100	
		* Add five works transferred to Kakrapur Canal.	675			
		Grand Total, Original Sanction ...	2,09,600			

(Signed) G. T. WAICH,
Ag. Dy. Chief Engineer for Irrigation,
for Chief Engineer for Irrigation.

No. 125 I.

No. 53-A.

Note by the Chief Engineer for Irrigation.

THE Narsapur canal for which a revised estimate is now submitted forms item 4 of the sanction* of the Government of India to the estimates for "completing and perfecting the system of irrigation and navigation in the Western Section of the Godavery Delta."

* Vide letter No. 367 I, dated 2nd August 1871, printed with G.O., No. 2,925, dated 18th November 1871.

2. The amount of the original sanction for this canal is Rupees 2,08,925,† that of the revised estimate now submitted is Rupees 2,12,100, the excess of Rs. 3,175 being slightly over 1½ per cent. Instead of this excess the revised estimate would have shown a saving had it not been that a tunnel at an estimated cost of Rupees 7,000 has been now provided for under the canal at 37½ miles to drain 5½ square miles which have no other means of getting rid of their surplus than a breach into the canal.

3. As will be seen from the comparative statement, the greater part of the work for improvement of this canal has been already carried out. The extension has been completed; five of the six new locks, all the four new lock weirs, and seventeen of the new irrigation sluices and minor masonry works have been built, and most of the earthwork of the distributaries has been carried out. The actual cost of the completed works has been Rupees 1,62,509† against an estimated cost of Rupees 1,67,968†.

4. Lieutenant Dorward's report accompanying the revised estimate gives very fully and clearly the nature of the chief differences between the old and new estimates.

5. The following is a complete statement of all the revised estimates, including the one now under notice, from which it will be seen that, notwithstanding the considerably greater completeness of the revised arrangements, their cost will not exceed the original ones by more than 2.29 per cent. :—

No. of Item of Sanction of Govt. of India in their No. 367 I, dated 2nd August 1871.	Name of Work.	Original Estimate.	Revised Arrangements.	Excess.	Saving.	G.O. sanctioning.	Remarks.
10	Gostanaddi and Velpur canal (part only).	RS. 90,960 (part of 1,41,060)	RS. 81,680	RS. ..	RS. 9,280	No. 1,338 of 16th May 1875.	Forwarded to Govt. of India with No. 2,930, dated 2nd November 1876.
1	Head sluice, main canal ..	19,500	53,650	..	14,850	No. 2,929 of 2nd Nov. 1876.	* Exclusive of Rupees 2,890 for Mid and Low level channel head sluices originally included in "Junction canal" estimate now transferred to Ellore canal.
2	Main canal ..	49,000	15,264	4,004	..		
6	Venkiah and Weyera ..	11,960	*69,610	..	5,392		
7	Restoring navigation with Weyera (Junction canal).	14,000	..	..	..		
17	Additional surplus weir near head of Ellore canal, (Nundamur).	..	..	..	..	..	..
18	Rest-houses ..	23,200	22,997	..	203	No. 7 I, dated 1st May 1877.	Sanctioned by Govt. of India in letter No. 158 I of 15th June 1877.
5	Bank canal ..	1,07,900	1,15,540	7,640	..	No. 1,362, dated 20th Apl. 1877.	
16	Ellore canal ..	2,46,590	2,76,604	30,014	..	..	
							† Inclusive of Rs. 2,890 as above.

No. of Item of Sanction of Govt. of India in their No. 367 I, dated 2nd August 1871.	Name of Work.	Original Estimate.	Revised Arrangements.	Excess.	Saving.	G.O. sanctioning.	Remarks.
Part of Item 14.	Kaza drain	rs. 5,760 (part of 28,200.)	Rs. 10,588	rs. 4,828	..	No. 1,449 of 27th Apl. 1877.	Forwarded to Govt. of India with No. 1,450 of 27th April 1877.
9	Attili canal	86,000	81,000	..	4,100	No. 1,277 of 14th Apl. 1877.	
15	"Drain west of Nursapur canal," now "Mogultur drain."	18,320	24,232	5,912	..	No. 1,407 of 24th Apl. 1877.	Forwarded to Govt. of India with No. 1,408 of 24th April 1877.
4	Nursapur canal	*2,08,925	*2,12,100	3,175	..	..	* Exclusive of five small works (estimate Rupees 676) transferred to Kakrapurru canal.
		9,51,725	9,73,473	55,573	33,825		
		..	9,61,725	33,825	..		
	Total Excess	..	21,748	21,748	..		

6. Care should be taken in constructing the several head sluices that the shutter gear is so arranged as not to make the top of the screw rise above the top of the parapet, otherwise the tow rope will be fouled and possibly the gear damaged. By somewhat lowering the gear beams and raising the parapets the desired clearance can readily be effected.

7. A temporary channel will need to be opened for navigation round the new Marter lock, unless this work can be completed and opened within the four months contemplated. The line for such a channel should be marked out, and no materials other than for concrete should be placed upon it until the progress of the work has been found to be fully equal to expectation. There is another line of navigation available by Yelurpad and the Uputern, but the detour is considerable, and the Nursapur canal navigation should be closed only for a limited time.

8. The undersigned considers that the report of the Range Officer on the revised estimate is very satisfactory, and the sanction of the latter is recommended.

FORT ST. GEORGE,
2nd August 1877.

(Signed) G. T. WALCH,
Ag. Dy. Chief Engr. for Irrigation,
for Chief Engineer for Irrigation.

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

No. 54. ORDER THEREON, 17th August 1877, No. 238 I.

THE revised estimate for the Nursapur Canal, Godavery Western Delta, which the Chief Engineer for Irrigation has submitted for sanction, amounts to Rupees

* Exclusive of the five works referred to in paragraph 3 of this Order. 2,12,100* and exceeds the original and sanctioned estimate by Rupees 3,175.

The excess is $1\frac{1}{2}$ per cent. on the sanction, and from the papers submitted it appears that the sanctioned works have, for the most part, been carried out individually, and all of them collectively, within the sanction, the increase in the estimate being due to improvements which are found to be necessary, the chief of which is the construction of an under tunnel in the 38th mile to drain lands† lying to the right of the canal which at present can be only partially and precariously cultivated.

† 3,400 acres.

2. It is further shown in the statement given in the Chief Engineer's note that the excess on all the revisions of estimates of the Western Delta made up to date is Rupees 21,748, or 2.29 per cent. on the original and sanctioned amounts of the estimates revised. This result is satisfactory, seeing that the works are stated to have been made more complete than was at first contemplated.

3. It is noticed that five small items belonging to the Kakrapurru canal, which were erroneously included in the Nursapur canal estimate have been omitted from the totals of both the original and revised estimates, and their transfer to the Kakrapurru canal is approved.

4. The revised estimate for the Nursapur canal is sanctioned according to the details shown in the comparative statement.

5. A copy of these Proceedings will be transmitted for the information of the Government of India.

6. This sanction has been registered as No. 119 I of 1877-78.

(True Extract.)

[Signature]

Colonel, R.E.,
Joint Secy. to Govt., P.W.D.,
Irrigation Branch.

To the District Engineer, Godavery.
Collector of Godavery.
District Engineer, Kistna.
Chief Engineer for Irrigation.
Examiner of Public Works Accounts.
Revenue Department.

Ext. A. Grubert.
Spare Copies

Revenue Department
No 3985
IRRIGATION
ACCOUNT.

Govt. of 1877 Madras.
PUBLIC WORKS.

To

The DISTRICT ENGINEER,
GODAVERY,
&c. &c. &c.

Dated August 17th

Issued

Recd. 12 September

G. O., 11th August 1877, No. 238 I.

AUGUST.

No. 53-54

Narsapur Canal, Western Delta, Godavery
District. - Sanctions with remarks the revised
estimate, amounting to Rupees 2,12,100, for
the -

No 5441
Comm. to the
Board of Revenue
13 Sept 77

No 1019/81

67429 Revenue 14-9-77