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MADRAS RECORD OFFICE

Government of Madras

Public Works DEPARTMENT

G.O. No. 729 (9) Press
~~B.P. No.~~ ~~Mis.~~

Dated 16-3- 1871.

Not to be folded or roughly handled

No. 376. Read the following endorsement of the Chief Engineer for Irrigation, dated Camp at Tripatty, 12th February 1875, No. 178 —

From Colonel A S MOBERLY, R E, District Engineer, Cuddapah, to Lieutenant-Colonel J MULLINS, R E, Chief Engineer for Irrigation, dated Cuddapah, 7th December 1874, No 1,740.

I HAVE the honor to submit, for the information of Government, the accompanying report from Mr Supervisor Pimm regarding the breaching of the Chintacoonta tank in the Jummalmadoogoo taluq in this district.

2. The Chintacoonta tank is situated in latitude 14° 42' N. and longitude 78° 23 E, at a distance of about 5½ miles west of the Railway station at Moodanoor The length of the bank was about 300 yards; on the north side it runs into the hill, but on the south side it abutted against a small hillock (which was detached from the south hill by a narrow opening, through which passed, what Mr Pimm styles, the ghaut road, but along which, I think, only cattle could have passed), the greater part of which is now washed away. The tank had no surplus escape, but there were two sluices, one of which, however, it appears had been useless for years, and is now destroyed The bank is about 50 feet above the fields. The area of the tank was about 1 square mile, and that of its catchment basin 9 square miles. The main feeder is from the south, and enters with a fall of about 25 feet per mile.

3. The tank was called a two and a half or three year tank, and had never before been known to be so full, the highest water-mark before being only got up to 66 62; and for this reason, I fancy, no provision had been made for a surplus escape. The cause of the damage may, however, be attributed rather to the bad material of which the upper part of the bank was formed.

4. On the 29th October the Chief Engineer of the Madras Railway informed me that he had heard that the Chintacoonta tank was in a very dangerous state, and begged me to have it cut so as to save it from breaching down upon the railway line, and on the same evening the Cuddapah Range Officer showed me a telegram from Mr Pimm saying that the tank was in great danger. On the next morning I went to the tank accompanied by Mr Haworth, the Railway Resident Engineer, and on examining the bank I learnt that during the night previous the heavy slip shown in the accompanying section had occurred, and I found the water pouring through in three jets I also found deep vertical fissures, some of which the villagers had been trying to fill up with stones The jets were issuing out at about 8 feet from the top of the bank, and as the water level was about 3 feet below the top of the bank this would be giving a head of 5 feet. As I found that the top of the bank was formed of stones and gravelly soil, I came to the conclusion that the only chance of saving the tank was to make a cut near the small hillock, where I thought there was probability of coming upon rock, and so gradually lower the water in the tank until we should get below the leak At first, however, I tried to deepen the channel cut by Mr Pimm through the ghaut road on the 26th October, but I found the ground so stony and hard, and the work progress so slowly from want of space for the people to work in, that I had a cut made on the north side of the hillock.

5. Having seen the work fairly started and good progress making, I at 2 P M. left Mr. Pimm with instructions to take out one course of the revetment at a time, and then to lower the water gradually by allowing only 3 inches in depth to pass until such time as he had got well below the level of the leak, when he might stop the discharge I had ordered all the people off the bank near the slip as I thought it might break through at any moment. For the after account of the breach I must refer you to Mr. Pimm's report. Mr. Pimm informs me that if 3 inches of water only had been allowed to run off at a time it would have had no effect as the drainage water from the hill streams was supplying a larger quantity. This might be, but I think the sluice was taking all this off. He further states that between 3 P M and 7 P M. the tank was only lowered about $\frac{7}{8}$ths of an inch.

6. I am of opinion that if the channel through the ghaut road had been cut on the 26th, and if the Reddies, &c, had given assistance to Mr. Pimm instead of being obstructive, the tank would have been saved with merely the loss of a few fields of paddy which would have been destroyed by the water passing over them On an after visit that I made to the tank on the 11th November, in company with the Acting Head Assistant, the Reddies and Curnums admitted to that officer that they had obstructed Mr. Pimm in cutting the channel because some of their fields would be damaged.

7. The widest part of the breach is 279 feet at top and 212 feet at the bottom, and the narrowest is 130 feet. The bottom of the breach is about 25 feet below the present bed of the tank, and 55 feet below top of bank.

8. Considering the extent of ayacut under this tank, *viz*, 264 acres, I do not think it worth the while of Government to restore it in its entirety, and think it would suffice to provide for a tank with only one-third the former capacity, and this can only be done by constructing an escape in the breach This, however, I am afraid would be found to be very expensive, and so before anything further is done I would suggest that a careful survey, &c, be made, and I therefore request the services of a good Surveyor for a period of two months for preparing the survey, levels, and plans.

From Mr H PIMM, Supervisor, Department Public Works, Sub-divisional Officer in charge of Cuddapah Range, to Colonel A S MOBERLY, R E, District Engineer, Cuddapah, dated Camp at Moodanoor, 15th November 1874, No 263—Through the Officer in charge of Cuddapah Range

I RESPECTFULLY beg to submit the following report on the Chintacoonta tank and the causes of it breaching Friday, 23rd ultimo, I wrote to the Reddy for a report on the tank, received an answer that not much water was then being received in the tank

Saturday, 24th ultimo.—Received a letter from the Reddy that the tank had received a great supply of water last night I at once went and inspected the tank bund (which seemed quite safe then, no crack could be seen), I then went to the supply channel intending to breach the channel bund and cut off the supply, but could not do it for want of tools

Sunday, 25th ultimo—I sent for tools as early as I could; went to the Chintacoonta supply channel, and made a breach in the channel bund and built a bund of stone boulders across the supply channel This turned off about three-fourths of the supply I would have completed this work, but the Reddy and Curnum would not get or give me a relief of coolies to work during this

night I was forced to leave it to be finished next morning As the Road Maistry and myself were left alone on the channel bund at about 6-30 P M I again inspected the tank bund, which still seemed quite safe, no cracks in the bund

Monday, 26th—A bund of earth, backing the stone boulders, was completed this morning across the supply channel, at about 12-30 noon I pointed out and requested the Reddies and Curnums to cut through the ghaut road I could not attempt to cut a surplus channel below the breach I had made in the supply channel for these reasons—*First*, I had not time, owing to the length and depth, which would be about half a mile in length and from 6 to 12 feet in depth. (This was what the heads of the village wanted)

Second, I had no one to assist me, and the supply would have been again turned into the tank before this channel could have been completed, as I would have to cut into the hill stream which I had turned the supply into I tried all I could to get my orders carried out to have a surplus channel cut that night to present water level (I gave the Reddy a written Telugu order that I held him responsible that he got this work done that night) If this was done I intended to have deepened it, as required afterwards, to about one yard in depth As I could not get orders obeyed, I went to the Railway Station and tried to telegraph to the Range Officer, but could not, but the Station Master sent one to the Railway Authorities at Camalapoor The Deputy Collector came up that night, and at his request I went again with a few Railway gang coolies at 12-30 midnight to the channel, but very little work was done that morning and the next day A few cracks, but very slight, appeared on the top of the bund today, longitudinally and diagonally, and the water was within 3 feet of the lowest portion of the top of the bund.

Tuesday, 27th—Remained on the work all day. The coolies the Deputy Collector ordered to be sent to me did not come I had in the afternoon about 100 coolies, but worked very unsatisfactorily, nor would the heads of the village use any exertion to get the work done, though I requested them often I asked for another set of coolies for the night, could not get them same as yesterday. The Reddy stated that he would tom-tom and ask them to work, but would not force them

Wednesday, 28th—Mr Millet (Railway Engineer) accompanied me to the tank bund. He stated he considered the tank in a dangerous state, and it was only a matter of time for it to give way from the cracks in the bund The cracks had opened from 6 to 9 inches during the last 24 hours The villagers did no work today except tried to fill in the cracks in the bund I told them it was of no use, but all the labor should be put on in cutting the channel through the ghaut road, this they did not attend to.

In the evening I inspected the tank bund again, and though the cracks had been filled in, the cracks appeared again and the water in some of the cracks seemed to be at about the same level as the water in the tank Sent a telegram to the Deputy Collector at Camalapoor, reporting the dangerous state of the tank bund, but received no answer

Thursday, 29th—A report was spread that the bund had breached I went and found that the bund near the centre had slipped in rear I did not stop as I could not now save the bund, but could assist to save human life I had on Tuesday last given warning for the villagers under the bund and in the valley to leave their houses; this afternoon I sent lascars and the police from village to village to drive the villagers out (Telegraphed to Range Officer and received a reply from the District Engineer)

Friday, 30th—Cut the tank bund at the south end, which appeared to be rocky ground, by personal orders of the District Engineer (who was on the bund), at 3 P M 3 inches of water was let through the cutting which was about a yard in breadth, this water assisted the cutting and removing the boulders on the south side, all boulders that could be removed were placed on the side and toe of the rear revetment to protect it from being scoured, at about 3-30 or 3-45 P M about 9 inches of water was let through the cutting, at about 4-45 or 5 P M I left off working at the cutting, and nearly 18 inches of water in depth at the mouth was then let through the cutting, all the labor for above another hour was in throwing stones and placing boulders on the side and toe of rear revetment to prevent it from being scoured. I would not have

let more than 12 inches of water in depth at the mouth if the revetment stones had been smaller, but one course of revetment stones had to be removed to carry out the District Engineer's orders, which were to keep letting off the water gradually by removing one course of revetment stones at a time at the mouth of the cutting when necessary, until the large jets of water ceased to run in the slip in the rear part of the bund I ordered twenty Wuddar coolies to come on the rock, and to remain all night with me to carry out the District Engineer's orders if required, and they were present, at 10-55 I was awakened by the bund giving way, I went at once on the hillock south of the cutting and saw that the north side had given way, and the hillock on which I was standing was scouring away very fast, and it was dangerous to remain on it, I ordered every one away at once The high flood only lasted about one hour. A little before 7 and again about 8-30 P M I inspected the cutting The bund and revetment was all right, but the water was scouring the side of the hill on the south side and had cut its way about 4½ feet in depth from the toe of the bund into the paddy fields I arrived at Moodanoor about 1-30 A M to give any assistance I could to the villagers and Railway Company The high flood had gone down, and the water was draining off by the river very fast No report has been received nor have I heard that any human life or cattle have been lost

The greatest damage was about 4 miles of the permanent-way of the railway being washed away, and in four places the embankment was breached

About half of the crops under the tank bund are destroyed One road culvert of 7 arches, the wing and parapet walls are washed away, likewise three of the largest road dams are more or less damaged, and one road dam washed away entirely. The old Bellary road is breached in many places, and the road surface for about 2½ miles more or less damaged (Another report on the roads will give full details of these damages) A number of dry-stone built houses in the village of Moodanoor were washed down during the flood I would have reported more fully on these damages, but you have inspected them all during your stay at Moodanoor this week

The breach in the tank bund is about 300 feet in length and about 70 feet in depth from the top of the bund, and about 25 feet below the general level of the tank bed I enclose a survey of the bund showing the breach (scale 100 feet to an inch) To repair this breach and restore the tank and to build a calingulah it will cost from Rupees 70,000 to Rupees 1,00,000 A contour survey of the tank with survey of bund and all necessary sections and plans of proposed calingulah will be sent in as soon as possible. The Poolivendalah Taluq Overseer will be placed on this work. I will take up the other duties of the sub-division until another Overseer is appointed

In continuation of my diary of the 26th ultimo, and statements abovementioned, I respectfully beg to state the following —The Deputy Collector (Mr Sharkey) asked what I required after I had explained and he had read my report to the Range Officer I stated as I could not get my orders carried out, I required some Revenue official who could force labor, he stated he would assist me by ordering coolies, and that he would send to me the next day a Tahsildar He left Moodanoor, and I received no assistance from him or through his orders.

If I had the Deputy Collector's assistance or any Revenue official as promised by him, I could have had the cutting through the ghaut road made to at least 1 or 1½ yards in depth below the water level, and in all probability it would have saved the tank.

SUBMITTED for the information of Government.

In G O, of the 9th January 1875, No 60, paragraph 3, attention was specially called to the Chintacoonta tank among others, the line of railway north of Moodanoor having been greatly injured by its breaching. On referring to G. O., No. 184, of the 20th January 1873, it will be seen that this tank was examined, and the report on it is as follows.—"The bund of the Chintacoonta tank requires no repair, it is very strong and revetted both front and rear. The present estimate provides for the repair of its supply channel."

Proceedings of the Madras Government, Public Works Department,
16th March 1875.

2 The tank had no means whatever of disposing of surplus, and none had ever been discharged. It is stated that on no former occasion had the water risen above a certain projecting stone on the interior face of the bund, which is at 5 33 feet below the level reached in October 1874 Although, therefore, the fact that no surplus weir or other means of discharging flood waters ought to have been stated when the tank was inspected with special reference to its situation above the railway, its past history was such as might reasonably induce the then Superintending Engineer to believe in its perfect safety. The tank has just been inspected, and it may be added that, without such a knowledge of the composition of the bund as could not have been expected, the only way in which its safety could have been ensured was necessarily unknown. Mr Pimm adopted the best possible means of averting the danger in cutting the southern supply channel and diverting the water coming from the hills in that direction, but this course was taken too late, and it is at most possible rather than probable that an earlier closure of this source of supply would have saved the tank.

3 The section of the bund at the breach, and the pits dug in the top of the bund at and near the slip, show that the lower part of the bund is of good red soil, but that the top for a depth of 3 to probably 8 feet at some places is of shale, stone, and gravel So long as the water was below or but a little above the top of the good soil no leaks showed themselves, but when the water had risen to a little over 70 or to 3 feet below the lowest part of the bund (73 36), slight cracks appeared, *vide* Mr Pimm's letter, diary account for the 26th October. Had it then been understood exactly what the circumstances were, and had the village officers exerted themselves and supplied labor, possibly by cutting a trench along the centre of the top of the bund to below the level of the considerable leaks, and filling in with good soil from the paddy fields, the danger might have been averted. This work would have been a difficult one, and in the absence of information as to the depth of gravelly soil and the exact position of the leak, together with the rapid rising of the tank, the task would have seemed well nigh hopeless, and it must be remembered that the villagers omitted to second effectually Mr. Pimm's efforts to save the tank The lowering of the pathway along the hill side at the south end of the bund may easily have seemed to be the only chance left, but the revelation of the character of the soil made by the breach indicates that, had Mr. Pimm succeeded in cutting a channel here, a breach would have resulted.

4. The cut in the embankment of the supply channel did some good, but it could help the tank only by diverting water, and it was on too high a level to draw off any of the water which had already entered the tank. Mr. Pimm showed much energy, and under less adverse circumstances his exertions might have been successful

5. The District Engineer has been requested to ascertain what work, if any, has been done to the tank bund within the last twenty years or so. If the raising of the bund was carried out before 1856-57, it will probably be useless to inquire into the circumstances.

6 With regard to the restoration of the tank it may be taken for granted that this should not be allowed unless it can be made perfectly safe, with adequate arrangements for disposing of surplus. The latter essential cannot be provided at

either end of the bund, neither can it be secured at the old full tank level of 66 62, but were the water raised to 72 an outfall could be got from the southern supply channel The restoration of the tank would, therefore, involve the following works —

1*st* —The removal of all the stony soil from the top of the bund.

2*nd* —The raising of the bund to 84 00, which could be done without any addition to the width of the lower part of the bund.

3*rd* —The selection of a position for a surplus weir in the right bank of the southern supply channel, and the choice will fall on one of two places, *viz*, that where the cut was made by Mr Pimm, and another a few hundred yards lower down where this bank was recently revetted—the selection will depend only upon economical considerations, and for its determination levels on both lines will be needed A surplus weir 120 feet long will be required, the maximum flood discharge being from 2,000 to 2,250 cubic feet a second, and the maximum depth to be allowed to pass over being 3 feet The supply channel between the surplus weir and the tank must not be less than 60 feet wide, with its bed 5 feet below full tank level or 2 feet below weir crest level. It will be better to make it 3 feet below crest level. The outfall channel where cutting may be needed should be 60 feet wide, and 1 foot below weir crest level at the commencement. Here also it will start with a width of 120 feet, which may be reduced to the normal width at a distance of 150 yards. The spoil banks to be placed 20 yards from the edges of the 60 feet channel The bed fall of this channel may be anything moderate which the levels may show to be convenient The fall of the country is great, and the channel will soon adjust its own bed fall.

4*th* —The closing of the breach will require some special precautions The best material available is certainly the silt in the tank bed, and this, if well consolidated, will be water-tight The junction with the bund on the north side should be made as noticed in this Office Circular, No 48, dated 21st December 1872.

On the south side the shale rock must be benched out for a width of 8 feet, and a depth of not less than 1 foot from the surface in horizontal steps, and on this a wall, also in steps, and projecting not less than 4 feet from the surface of the rock, should be built This wall to be 7½ feet thick at the lower part, with face batters of 1 in 8 on either side Above the rock a trench 9 feet wide must be carried 12 feet into the hill from its face The bed or floor of the breach is almost horizontal, and consists of silt in which a trench 12 feet wide should be cut down to the solid ground below and 3 feet into the latter The front and rear slopes of the bund at the breach to be made to correspond with the old bund, the former to be carefully revetted upon a stone and gravel backing, a lighter revetment will do for the rear slope The bund at the breach will be 64 feet high, and it will suffice if for a width of 70 feet at base and 6 feet at top the central part be formed of silt. The gravelly soil will be better for the outsides of the bund on either side and will probably be equally cheap

7 The Collector's opinion on the question of the restoration of the tank should be obtained A rough estimate of the cost amounts to Rupees 25,000. The revenue statement submitted by the District Engineer for the years 1864 65 to 1873-74 gives the following particulars —

	Ayacut	Cultivation
Government lands .	Acres 143, Rs 1,893	Acres 135, Rs 1,996
Inam do	„ 136 „ 2,054	„ 117 „ 122

consequently the Government interests at stake may be taken at Rupees 2,120 yearly; but the interests of the Inamdars are of somewhat greater extent. It would appear that the tank having been kept in good order, and having been destroyed by natural causes which have operated for the first time since its construction, if it be considered that the measures taken to prevent the breaching of the tank were, though unsuccessful, the best which the circumstances admitted, and that it would have breached had it been left alone, the Government are not under an obligation to restore the tank in order to re establish the value of the inams, and if so it would seem that the Inamdars may properly be asked to contribute towards the expense of making the tank again capable of irrigating the lands under it. Moreover, the tank is said to have been a three years' tank, and probably it may be deemed to have been capable of irrigating 400 acres on the average, and if restored in the manner suggested it may be assumed that this area can be irrigated. The average area for the period named has been 252 acres, and consequently 148 acres additional could be brought under the tank. The average revenue derived from the Government lands has approximated to 15 Rupees an acre There is, so far as can be judged from an inspection of the country, plenty of land available for irrigation, but for many years to come this would not be capable of paying a very high rate of assessment, and probably the additional land to be brought under the tank would not do more than compensate for the loss of revenue on highly assessed lands rendered unfit for cultivation.

8. The District Engineer has been requested to obtain the information necessary to enable the details of the restoration to be determined, and he has been informed that the survey establishment required for the purpose will be sanctioned. It will be necessary to ascertain what cultivated lands, if any, on the margin of the tank, will be submerged by raising the water level as proposed, and in the meantime it is suggested that the question of restoration should be settled in the Revenue Department.

9. In the same Order of Government reference is made to the damage sustained by the railway between Rajampett and the Cheyaur by the bursting of two tanks. The only tank, however, which gave way was the Munnoor Kitchemma tank * The repairs supposed to be necessary were carried out, and the bund was in good order except that it appeared possible that leakage may have led to the breach in the southern part of the bund The surplus weirs, two in number and giving a water-way of 101 feet, were certainly inadequate The area of the catchment basin is not determinable from the Atlas sheet, and the District Engineer has applied for the Revenue Survey sheets, but, should these not give the required information, the position of the water-shed must be ascertained by a reconnoisance or survey. It is believed at present that the drainage of some 8 square miles is received, and if so the water-way required will be 120 to 140 more than the

No 60, 9th January 1875

* *Vide* statement in Proceedings, Madras Government, No 963, of the 28th March 1873.

the tank now possesses, and this or more can without difficulty be afforded in the south bund The rainfall at the nearest station, Pullempett,* where a register was kept, was 10 45 inches in 24 hours The tanks in this part of the district, as seen from the railway, show that attention has during the past two or three years been paid to their repair, and the bunds are generally in very good order Most of them appear to have suffered but slight injuries from the severe trial which they under-went last October, and they have been able to retain a full supply With the instructions which have been issued regarding the proper treatment of tanks, there should be no difficulty in making each one affecting the railway perfectly safe before the next monsoon, and the rest should be similarly dealt with as quickly as possible.

* A few miles south

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

No 377. ORDER THEREON, 16th March 1875, No. 729

IRRIGATION, No. 25.

WITH the foregoing endorsement the Chief Engineer for Irrigation submits the reports received by him from the District Engineer, Cuddapah, of the circumstances attending the breaching of the Chintacoonta tank in October last, whereby much of the embankment of the railway over a length of about 4 miles to the north of Moodanoor was washed away.

2. It appears that the tank had no means of disposing of surplus, and that without material modification of its full supply level the provision of an escape would have been hardly practicable, that the want of a surplus weir has never before been experienced, and that in the floods of October last the water rose some 5½ feet above the highest level before known The bund was apparently in good order, but the upper part of it turns out to have been composed of porous soil, and when the water had risen to 3 feet below the lowest part of the bund dangerous leaks appeared, a heavy slip occurred, and, the breaching of the tank at this point being imminent, the District Engineer tried to save it by making a cut at the south end, and there being no rock at a high level in the hill side but only gravel, control over the water was soon lost, and a breach occurred. Previous to this, however, the southern supply channel of the tank had been breached, and the supply from that source diverted, but so much water came down from the hills to the west and north that the tank level continued to rise.

3. His Excellency the Governor in Council considers that, although the exact circumstances of this tank ought to have been more accurately ascertained and reported in 1872, these were not such as to make an accident at all probable. The tank is an old work, and until recently it would have been deemed perfectly safe Every exertion was made also by the Public Works Department to avert disaster when the danger became imminent.

4. The question of the restoration of the tank will be referred to the Revenue Department for early determination.

5. The Chief Engineer for Irrigation has also reported on the breaching of the Kitchemmah tank near Rajampett, and it is shown that the apparent requirements of this tank were provided for, but that its drainage basin was not, and remains to be, ascertained, and that, although it has escapes upwards of 100 feet in length, the means of disposing of surplus need probably to be more than doubled. What is necessary should be at once ascertained and carried out before the next monsoon.

(True Extract.)

Colonel, R E.,
Secretary to Government

To the District Engineer, Cuddapah
" Consulting Engineer for Railways
" Chief Engineer for Irrigation
" Revenue Department

Exd S T Austin
Spare Copies

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To the District Engineer, Cuddapah
" Consulting Engineer for Railways
" Chief Engineer for Irrigation
" Revenue Department

Exd S T Austin
Spare Copies

Jno Goldingham

Leuddapah District
Engineers Office
No 1740 Dated 20th December 1874

From

The District Engineer

Leuddapah

To

The Chief Engineer

for Irrigation

Madras

Sir

I have the honor to submit for the information of Government the accompanying reports from my Sub Overseer on Public Works regarding the breaching of the Chintacoonta Tank in the Jummalmadoogoo Taluk in this District.

2. The Chintacoonta Tank is situated in Latitude 14° 42' and Long: 78° 12' E at a distance of about 5½ miles West of the Railway Station at Moodanoor. The length of the bank was about 300 yards; on the North side it runs into the hill, but on the South side it abutted against a small hillock which was detached from the South Hill by a narrow opening through which

Encl 7.

which passed what Mr Pimm styles the Ghaut Road but along which I think, only (cattle could have passed) the greater part of which is now washed away. The tank had no surplus escape, but there were two sluices, one of which however it appears had been useless for years and is now destroyed. The bank is about 50 feet above the fields. The area of the Tank was about one Square mile and that of its catchment basin 9 Square miles. The main feeder is from the South and enters with a fall of about 25 feet per mile.

3. The Tank was called a 2½ or 3 year Tank and had never before been known to be so full the highest water mark before being only got up to 66.62 and for this reason Fancy no provision had been made for a surplus escape. The cause of the damage may however be attributed rather to the bad material of which the upper part of the bank was formed.

4. On the 29th October the Chief Engineer of the Madras Railway informed me that he had heard that the Chintaverutah was in a very dangerous state and begged me to have it cut so as to save it from breaching down upon the Railway line and on the same evening the Deputy Police Officer showed me a Telegram from Mr Pimm saying that the Tank was in great danger. On the next morning I went to the Tank accompanied by Mr Haworth the Railway Resident Engineer and on examining the bank I learnt that during the night previous the heavy slip shown in the accompanying section had occurred and I found the water pouring through in three jets. I also found deep vertical fissures some of which the villagers had been trying to fill up with stones. The jets were issuing out at about 8 feet from the top of the bank

and

and as the water level was about 3 feet below the top of the bank this would be giving a head of 5 feet. As I found that the top of the bank was formed of stones and gravelly soil I came to the conclusion that the only chance of saving the Tank was to make a cut near the small hillock where I thought there was probability of coming upon rock and so gradually lower the water in the Tank until we should get below the leak. At first however I tried to deepen the channel cut by Mr Penny through the Chank Road on the 26th October but I found the ground so stony and hard and the work progress so slowly from want of space for the people to work, & that I had a cut made on the North side of the hillock.

5. Having seen the work fairly started and good progress

making I at 2 P.M. left him with instructions to take out one course of the Revetment at a time and then to lower the water gradually by allowing only three inches in depth to pass until such time as he had got well below the level of the leak when he might stop the discharge. I had ordered all the people off the bank near the slip as I thought it might break through at any moment. For the after account of the breach I must refer you to Mr Penny's report. Mr Penny informs me that if 3" of water only had been allowed to run off at a time it would have had no effect as the drainage water from the hill streams was supplying a larger quantity. This might be but I think the channel was taking all this off. He further states that between 3 P.M. and 7 P.M. the tank was only lowered about

7/8

3 inches would have very little effect

Explain

7/8 of an inch.

6. I am of opinion that if the Channel through the Ghaut Road had been cut on the 26th and if the Reddies had given assistance to Mr Penn instead of being obstructive the tank would have been saved with merely the loss of a few fields of paddy which would have been destroyed by the water passing over them, On an after visit that I made to the Tank on the 11th November in company with the Acting Head Assistant the Reddies and Cummins admitted to that Officer that they had obstructed Mr Penn in cutting the channel because side of their fields would be damaged.

7. The widest part of the breach is 279 feet at top and 212 feet at the bottom and the narrowest is 130 feet. The bottom of the breach is about 25 feet below the present bed of the tank and 55 feet below top of bank.

8. Considering the extent of ayacut under this tank viz 264 Acres I do not think it worth the while of Government to restore it in its entirety and think it would suffice to provide for a tank with only one third the former capacity and this can only be done by constructing an escape in the breach this however I am afraid would be found to be very expensive and so before any thing further is done I would suggest that a careful Survey &c be made and I therefore request the service of a good Surveyor for a period of two months for preparing the Survey, levels and plans.

I have the honor to be
Sir
your Most Obedient Servant

J. Cobbe Colonel R.E.
District Engineer

17

Volume 178 - 122.75

No 1740

From Collr No 2331.

The District Engineer

Cuddalore

To J. W 1082/75

The Chief Engineer

for Irrigation

Madras

Dated 7th December

Received 10th " 1874

Answd X 15

Submits a Report

received from Mr.

Penny regarding the

breaching of the

Chinta poptuk Bank

and suggests that

a Surveyor be employed

for 2 months for

Surveying & Levelling

purposes &c.

Vol. 178 - 72.75

No 1740

From Ge No 2331.

The District Engineer

Guadalajara

To S. W. 1682/75

The Chief Engineer

for Irrigation

Madrid

Date 17th

Received 10th December 1874

Answd X 15

Submits a Report

received from Mr.

Primm regarding the

breaching of the

Chintapooptuk Bank

and suggests that

a Surveyor be employed

for 2 months for

surveying & levelling

purposes.

I would have Completed this Work, but the Headsman Cunnam would not get a sufficience of Coolies to finish during the night, I was forced to leave it to be finished next Morning as the Head Master and myself were left alone on the Channel Bund at about 6-30 P.M.

I again inspected the Tank Bund which I left seemed quite safe no cracks in the bund.

Monday 26th a bund of earth, backing the Stone boulders was Completed this morning across the Supply channel at about 12-30 noon I pointed out and requested the Reddies and Cummums to Cut through the Chaut Road. I could not attempt to cut a surplus channel below the breach I had made in the Supply channel for three reasons. 1st I had not time, owing to the length & depth, which would be about half a mile in length and from 6 to 12 feet in depth (This was what the Headsman of the Village wanted)

2nd I had no one to assist me and the Supply would have been again turned in to the Tank, before this channel Could have been Completed, as I would have had to Cut in to the Hill stream which I turned the Supply in to. I tried all I could to get my orders carried out to have a surplus channel Cut that night to present Water level (I gave the Reddy a written Tabrgon Order that I held him responsible that he got this work done that night) If this was done, I intended to have deepened it, as required afterwards, to about one yard in depth. as I could not get orders obeyed. I went to the Railway Station and tried to Telegraph to the Range Officer but could not. but the Station Master Sent one to the Railway authorities at Canalapoor The Deputy Collector came up that night and at his request I went again with a few Railway Gang Coolies at 12-30 midnight to the channel; but very little work was done that morning and the next day - a few cracks but very slight, appeared in the top of the bund to day Longitudinally and Diagonally, and the Water was within 3 feet of the lowest portion of the top of the bund.

Tuesday 27th Remained on the Work all day. The Coolies the Deputy Collector ordered to be sent to me did not come I had in the afternoon about 100 Coolies but worked very unsatisfactorily nor would the Head of the Village use any exertion to get the Work done, though I requested them often I asked for another set of Coolies for the night, could not get them same as yesterday. The Reddy stated that he would Tom Tom and ask them to Work but would not force them.

Wednesday 28th Mr Millet (Railways Engineer) accompanied me to the Tank Bund. He stated he

Considered

Considered the Tank in a dangerous State and it was only a matter of time for it to give way, from the cracks in the bund. The cracks had spread from side to side during the last 24 hours. The Villagers did no work to day except tried to fill in the cracks in the bund. I told them it was of no use, but all the Labour should be put to in Cutting the channel through the Tank Bund this they did not attend to.

In the evening I inspected the Tank bund again & through the Cracks had been filled in, the cracks appeared again and the Water in some of the cracks seemed to be at about the same level as the Water in the Tank.

Sent a Telegram to the Deputy Collector at Comalapoor reporting the dangerous State of the Tank Bunds ~~but receiving no answer~~

Thursday 29th A report was spread that the bund had breached, I went and found that the bunds near the Centre had slipped in a few. I did not stop as I could not do any thing to the bund, but could assist to save Human life. I had on Tuesday last given warning to the Villagers under the bund and in the Valley to leave their houses, this afternoon I sent Peons and the Police from Village to Village to drive the Villagers out & informed the Range Officer and Revenue Inspector of the District Engineer

Friday 30th Cut the Tank bund at the South end to where appeared to be rocky ground, by personal orders of the District Engineer, who was on the bund at 8 A.M.

three inches of water was let through the Cutting which was about a yard in breadth, the water scoured the Cutting and removing the boulders on the South side of the ~~the 2nd time~~ all boulders that could be removed were placed on the side and top of the Embankment to protect it from being scoured at about 3 P.M. the Quantity inches of water was let through the Cutting at about 4 P.M. Finishing the Cutting at the 2nd time and nearly 12 inches of water in depth at the bottom of the Cutting all the labourers & others I could was employed throwing down and placing boulders on the side and top of Embankment to prevent it from being scoured. I should not have let more than 12 inches of water in depth at the mouth of the Embankment stones had been put in, but the Course of Embankment stones had to be removed to carry out the District Engineers orders, which were to keep letting off the water gradually by Cutting and Course of Embankment stones at a time at the mouth of the Cutting when necessary until the large jets of water ceased to run on the slope in the Centre part of the bund & ordered 20 Moodar Coolies to come on the 2nd, and to remain all night with me to carry out the District Engineers orders if required by the Engineer present at 10-55 P.M. was informed by the bund guard two ways I went at once on the Gillock South of the Cutting and saw that the north side had given way and the Creek on which I was standing was scouring away very fast, and it was dangerous to remain on it

P

I ordered every one away at once. The High flood only lasted about one hour. a little before 7 and again about 8-30 P.M. I inspected the Cutting. The bund and Revetment was all right, but the Water was running the side of the Hill on the South side and had Cut a Way about 4½ feet in depth from the toe of the bund into the paddy fields. I arrived at Moodaamoor about 1-30 A.M. to ~~find~~ give any assistance I could to the Villagers and Railways Company's. The High flood had gone down and the Water was draining off by the River very fast. No Report has been received or have I heard that any human life or Cattle have been lost.

The greatest damage, was about 4 Miles of the permanent Way of the Railways being washed away and in four places the embankments washed breached.

About half of the Crops under the Tank bund are destroyed.

One Road Culvert of 7 arches, the Wing and Apron pet Walls are washed away, likewise three of the largest Road Dams are more or less damaged, and one Road Dam washed away entirely.

The Old Bellary Road is breached in many places and the Road surface for about 2½ Miles more or less damaged.

(another report on the Roads will give full details of these damages). A number of clay & stone built houses in the Village of Moodaamoor were washed down during the flood. I would have reported more fully on these damages, but you have instructed them all during your

8
25

Stay at Moodaamoor two Weeks.

The breach in the Tank bund is about 300 feet in length and about 70 feet in depth from the top of the bund and about 25 feet below the general level of the Tank bed. I enclose a Survey of the bund showing the breach (scale 100 feet to an inch) To repair the breach and restore the Tank and to build a Calingula it will cost from Rs 70,000 to Rs 100,000. A Contour Survey of the tank with Survey of Bund and all necessary sections and plans of proposed Calingula will be sent in as soon as possible. The Postmaster's Calingu Overseer will be placed on this Work I will take up the other duties of the Sub Overseer until another Overseer is appointed.

In Continuation of my Diary of the 26th Ultimo and Statements above mentioned I respectfully beg to state the following. The Deputy Collector (Mr Sharkey) asked what I required, after I had explained and he had read my Report to the Range Officer I stated as I could not get my orders carried out, I required some Revenue Officer who could force labour he stated he would assist me by ordering Coolies & that he would send to me the next day a Tahsildar. He left Moodaamoor and I received no assistance from him or through his orders.

If I had the Deputy Collectors assistance or any Revenue Official as promised by him, I could have had the Cutting through the Channel Road made to at least 1 or 1½ yards in depth below the water level and in all probability

6

it

it would have saved the Tank.

I beg to Remain
Sir
Your Humble Servant
H Pierce
Superintendent &c.
Sub Divisional Officer
Cuddapah Ranges

examined and the report on it is as follows:- "The bund of the Chintacoonta tank requires no repair, it is very strong and revetted both front and rear. The present estimate provides for the repair of its supply channel."

2 "The tank had no means whatever of disposing of surplus, and none had ever been discharged. It is stated that on no former occasion had the water risen above a certain projecting stone on the interior face of the bund, which is at

5.33

No 178

Return Abstract for the undermentioned Quarter.

Quarterly Abstract of Returns of Tanks for the Quarter ending 31st March 1875.

Under the Provisions of Act XXVI of 1869, attention was specially directed to the Circular No 1 of 1870 issued from this Office.

Tanks.

1. Number of Tanks in the Line of Railway Route.
2. Number of Tanks examined by the Engineer during the Quarter.
3. Number of Tanks reported as requiring repairs.
4. Number of Tanks reported as requiring repairs, but not urgently.
5. Number of Tanks reported as requiring repairs immediately.
6. Number of Tanks for which no estimates have been received.
7. Number of Tanks for which estimates have been received, but not sanctioned.
8. Number of Tanks for which estimates have been sanctioned, but the repairs not completed.
9. Number of Tanks repaired during the Quarter.
10. Number of Tanks in which water has been found during the Quarter.
11. Number of Tanks in which water has been found above certain prescribed Stone or Mark.
12. Number of Tanks in which water has been found below certain prescribed Stone or Mark.
13. Number of Tanks in which water has been found on the interior face of the Bund, which is above the exterior face of the Bund.

5.33

The Sub Divisional Officer
Cuddapah Range
Ono 6/2331/74

The District Engineer
Cuddapah

Thro the Officer in charge
Cuddapah Range

Dated 15th November 1874
Rec'd 18th
No 263

Submits a Report on the breaching of the Chintacontah Tank and the damages caused to the Road by the same,

P W 1082/75
6

5.33 feet below the level reached in October 1874. Although therefore the fact that no surplus weir or other means of discharging flood waters ought to have been stated when the tank was inspected with special reference to its situation above the Railway, its past history was such as might reasonably induce the then Superintending Engineer to believe in its perfect safety. The tank has just been inspected, and it may be added that, without such a knowledge of the composition of the bund as could not have been expected, the only way in which its safety could have been ensured was necessarily unknown. Mr. Pimm adopted the best possible means of averting the danger in cutting the Southern supply channel and diverting the water coming from the hills in that direction, but this course was taken too late, and it is at most possible rather than probable that an earlier closure of this source of supply would have saved the tank.

3. The section of the bund at the breach, and the pits dug in the top of the bund at and near the slip show that the lower part of the bund is of good red soil, but that the top for a depth of 3 to probably 8 feet at some places is of shale, stone, and gravel. So long as the water was below or but a little above the top of the good soil no leaks showed themselves but when the water had risen to a little over 70 or to 3 feet below the lowest part of the bund (73.36) slight cracks appeared vide Mr. Pimm's letter, diary account for the 26th October. Had it then been understood exactly what the circumstances were, and had the Village Officers exerted themselves and supplied labour possibly by cutting a trench along the centre of the top of the bund to below the level of the considerable leaks and filling in with good soil from the paddy fields the danger might have been averted. This work would have been

been a difficult one and in the absence of information as to the depth of gravelly soil and the exact position of the leak, together with the rapid rising of the tank, the task would have seemed well nigh hopeless, and it must be remembered that the villagers omitted to second effectually Mr Pinnow's efforts to save the tank. The lowering of the path-way along the hill side at the South end of the bund may easily have seemed to be the only chance left, but the revelation of the character of the soil made by the breach indicates that, had Mr Pinnow succeeded in cutting a channel here, a breach would have resulted —

4 The cut in the embankement of the supply channel did some good, but it could help the tank only by diverting water, and it was on too high a level to draw off any of the water which had already entered the tank. Mr Pinnow showed much energy and under less diverse circumstances his exertions might have

have been successful —

5 The District Engineer has been requested to ascertain what work, if any, has been done to the tank bund within the last 20 years or so. If the raising of the bund was carried out before 1856-57 it will probably be useless to enquire into the circumstances.

6 With regard to the restoration of the tank it may be taken for granted that this should not be allowed unless it can be made perfectly safe, ~~and~~ with adequate arrangements for disposing of surplus. The latter essential cannot be provided at either end of the bund, neither can it be secured at the old full tank level of 66.62, but were the water raised to 72 an outfall could be ~~got~~ from the Southern supply channel.

The restoration of the tank would therefore involve the following works —

1st the removal of all the stony soil from the top of the bund.

2nd the raising of the bund to 84.00 which could

could be done without any addition to the width of the lower part of the bund.-

3- the selection of a position for a surplus weir in the right bank of the Southern supply channel and the choice will fall on one of two places, viz that where the cut was made by Mr. Pinny and another a few hundred yards lower down where this bank was recently revetted. the selection will depend only upon economical considerations, and for its determination levels on both lines will be needed. A surplus weir 120 feet long will be required, the maximum flood discharge being from 2000 to 2250 cub. ft. a second, and the maximum depth to be allowed to pass over being 3 feet. The supply channel between the surplus weir and the tank must not be less than 60 feet wide with its bed 5 feet below F.T.L. or 2 feet below weir crest level. It will be better to make it 3 feet below ~~crest~~ crest level. The outfall channel where cutting may be needed should be 60 feet wide and 1 foot below weir crest level at the commencement. Here also it will start with a width of 120 feet which may be reduced to the normal width at a distance of 150 yards. The spoil banks to be placed 20 yards from the edges of the 60 feet channel. The bed fall of this channel may be any thing moderate which the levels may show to be convenient. The fall of the country is great and the channel will soon adjust its own bed fall.

4th The closing of the breach will require some special precautions. The best material available is certainly the silt in the tank bed and this if well consolidated will be water tight. The junction with the bund on the north side should be made as noticed in this Office Circular No. 16 dated 21st Dec. 1872. On the South side the shale rock must be benched out for a width of 8 feet and a depth of not less than 1 foot from the surface in horizontal steps, and on this a wall also in steps and projecting not less than 4 feet from the surface of the rock should be built

built. The wall to be 7½ feet thick at the lower part with face batters of 1 in 8 on either side. Above the rock a trench 9 feet wide must be carried 12 feet into the hill from its face. The bed or floor of the breach is almost horizontal, and consists of silt in which a trench 12 feet wide should be cut down to the solid ground below and 3 feet into the latter. The front and rear slopes of the bund at the breach to be made to correspond with the old bund, the former to be carefully revetted upon a stone and gravel backing: a lighter revetment will do for the rear slope. The bund at the breach will be 64 feet high, and it will suffice if for a width of 70 feet at base and 6 feet at top the central part be formed of silt. The gravelly soil will be better for the outsides of the bund on either side and will probably be equally cheap.

7. The Collector's opinion on the question of the restoration of the tank should be obtained. A rough estimate of the cost amounts to Rupees 25,000. The revenue

statement submitted by the District Engineer for the years 1864-65 to 1873-74 gives the following particulars:-

	Ayacut	Cultivation
Government lands	Acres 143 Rupees 1898.	Acres 135 Rupees 1996
Inam do	" 136 " 2054	" 117 " 122

Consequently the Government interests at stake may be taken at Rupees 2120 yearly: but the interests of the Inamdars are of somewhat greater extent. It would appear that the tank having been kept in good order and having been destroyed by natural causes which have operated for the first time since its construction ~~of the tank~~, if it be considered that the measures taken to prevent the breaching of the tank were, though unsuccessful, the best which the circumstances admitted, and that it would have breached had it been left alone, the Government are not under an obligation to restore the tank in order to re-establish the value of the

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the Inams, and if so it would seem that the Inamdars may properly be asked to contribute towards the expense of making the tank again capable of irrigating the lands under it. Moreover the tank is said to have been a 3 years tank, and probably it may be deemed to have been capable of irrigating 400 acres on the average, and if re-stored in the manner suggested it may be assumed that this area can be irrigated. The average area for the period named has been 252 acres, and consequently 148 acres additional could be brought under the tank. The average Revenue derived from the Government lands has approximated to 15 Rupees an acre. There is, so far as can be judged from an inspection of the country, plenty of land available for irrigation, but for many years to come this would not be capable of

paying a very high rate of assessment and probably the additional land to be brought under the tank would not do more than compensate for the loss of revenue on highly assessed lands rendered unfit for cultivation.

8. The District Engineer has been requested to obtain the information necessary to enable the details of the restoration to be determined, and he has been informed that the survey establishment required for the purpose will be sanctioned. It will be necessary to ascertain what cultivated lands, if any, on the margin of the tank will be submerged by raising the water level as proposed, and in the mean time it is suggested that the question of restoration should be settled in the Revenue Department.

No. 60-9 dt. January 1875

9. In the same order of Government reference is made to the damage sus-tained by the Railway between Raja-pett

Rajampett and the Cheyaur by the bursting of 2 tanks. The only tank however which gave way was the Munnoor Kitchemma tank*. The repairs supposed to be necessary were carried out, and the bund was in good order except that it appeared possible that leakage may have led to the breach in the Southern part of the bund. The surplus weirs two in number and giving a water-way of 101. feet were certainly inadequate. The area of the catchment basin is not determinable from the Atlas sheet and the District Engineer has applied for the Revenue Survey sheets, but should these not give the required information the position of the watershed must be ascertained by a reconnoissance or survey. It is believed at present that the drainage of some 8 square miles is received, and if so the water way required will be 120 to 140 more than the

* vide statement in Pros. Madras Govt. No 963 of the 28 March 1873.

the tank now professes, and this or more can without difficulty be afforded in the South bund. The rain fall at the nearest station, Pullampett* where a register was kept was 10.1.5 inches in 24 hours. The tanks in this part of the District, as seen from the Railway, show that attention has during the past 2 or 3 years been paid to their repair, and the bunds are generally in very good orders. Most of them appear to have suffered but slight injuries from the severe trial which they underwent last October, and they have been able to retain a full supply. With the instructions which have been issued regarding the proper treatment of tanks, there should be no difficulty in making each one affecting the Railway perfectly safe before the next

* a few miles South

next monsoon, and the rest should be similarly dealt with as quickly as possible.

Camp at Tripatty
12th February 1875.

Lieutt Colonel Dundas R.E.
Chief Engineer for Irrigation.

To,
The Secretary to Government
P.W.D.

45 14 18

1875)

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of

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received

ay Mem from the District Engineer Cuddapah of the circumstances attending the breaching of the Chintacoonta tank in October last, whereby much of the embankments of the Railway over a length of about 4 miles to the North of Moodanoor was washed away.

2 It appears that the

Dy. No.

Ok Dept

Proceedings of the Madras Government

Read the following:-

Letter from the Chief Engineer for Irrigation } (Ad No 178 dy 12th Feby 1875)

729

With the foregoing endorsement the Chief Engineer for Irrigation submits the reports received by him from the District Engineer Cuddapah of the circumstances attending the breaching of the Chintacoonta tank in October last, whereby much of the embankments of the Railway over a length of about 4 miles to the North of Moodanoor was washed away.-

2 It appears that the

P.W.D. No 178 dy 12th Feby 1875

Rd 23rd Feby 1875 No 442-444
20th March 435-438
20th Feby 3 No 376-377
25th March 665-671
9th Feby 5 & 139-141

P.W.D.

From The Chief Engr for Irrigation

To The Secy to Govt P.W.D.

No 1082 dy 12 Feby 1875

R. 18th Feby 1875
2 Encls Ltr & Dy Nos.

Submits with remarks extract reporting the breaching of the Chintacoonta Tank.

G.O. No. 729 dy 25th Feby 75

No 376

Dup. 2-75

the tank had no means
of disposing of surplus
and that without ma-
terial modification of
its full supply level the
provision of an escape
would have been hardly
practicable; that the
want of a surplus weir
has never before been
experienced, and that in
the floods of October
last the water rose some
5⅓ feet above the highest
level before known. The
bund was apparently
in good order, but the
upper part of it turns
out to have been com-
posed of porous soil, and
when the water had
risen to 3 feet below the
lowest part of the bund

dangerous

mination.

dangerous leaks appeared,
a heavy slip occurred, and
the breaching of the tank
at this point being im-
minent, the District
Engineer tried to save it
by making a cut at the
South end, and there
being no rock at a high
level in the hill side
but only gravel control
over the water was soon
lost, and a breach occurred.
Previous to this however
the Southern supply chan-
nel of the tank had been
breached and the supply
from that source diverted
but cannot now be
drawn from the hill
the wind and
the tank has
to rain.

Engineer
has also
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3. His Excellency the Governor in Council considers that, although the exact circumstances of this tank ought to have been more accurately ascertained and reported in 1872, these were not such as to make an accident at all probable. The tank is an old work, and until recently it would have been deemed perfectly safe. Every repertion was made also by the Public Works Dept^t to avert disaster when the danger became imminent.

4. The question of the restoration of the tank will be referred to the Revenue Department for early determination.

5 The Chief Engineer for Irrigation has also reported on the breaching of the Kitchemmah tank near Rajampett, and it is shown that the apparent requirements of this tank were provided for, but that its drainage basin was not, and remains to be, ascertained; and that although it has escapes upwards of 100 feet in length the means of disposing of surplus need probably to be more than doubled. What is necessary should be at once ascertained and carried out before the next monsoon.—

Ed^d S.F.

Hy. 13/2/75

To The Distt Engr Cuddapah ✓
12 " — Consulting Engr for Railways ✓
5 " — Chief Engr for Irrigation ✓
2 " Revenue Dept^t ✓

√ 1082

Govt. of 1875; Madras.

PUBLIC WORKS.

To Supdt Engineer Cuddapah

Dated

Recd Encl

G O. 16 March 1875, No. 729

Nos. 376-377.

Chintagoonta & Kitchemmah Tanks

Passing Orders on report submitted with Memorandum by Chief Engr for Irrigation on the encroaching of the ____ in the Cuddapah District

No 376-377 Rec'd

619-2-75

Proceedings of the Madras Government, Public Works Department,
16th March 1875.

Read the following papers —

No 378 From Captain J. PENNYCUICK, R E, District Engineer, North Arcot, to Lieutenant-Colonel J MULLINS, R E, Chief Engineer for Irrigation, dated Vellore, 15th August 1874, No 1,438

I HAVE the honor forward, herewith, an estimate, amounting to Rupees 53,000, with plans and sections, for the repairs and improvements required to the Caveri-pauk tank

1 Estimate
1 Set of Plans

2. Full reports have been made from time to time of the work in progress on this tank, and the operations up to the end of September last were fully described in my letter, No 2,242, of 11th October 1873, printed with G O, No 123 of 19th January 1874.

3 Since the date of the above letter the work done has been mainly confined, as explained in my letter No 3,247, of 14th January last, printed with G O, No. 626, of 10th March, to the improvements to the revetment, sectioning and turfing the slopes, and gravelling the top of the bund, the only other work done having been the insertion of the puddle trench and stone drains directed in paragraphs 4 and 5 of your note printed with the same order

4 The puddle trench has not been of much use, the leakage appearing to go much deeper than the level of the fields in rear, down to which the puddle was carried as directed As, however, the leakage is entirely under the bund and not through it, and does not affect the stability of the bund in any way, it is of no practical importance, the water which passes out is not even wasted, but used for cultivation

5 The stone drains so far as they have yet been executed have proved very serviceable, even at the bungalow, where the leakage was worst, the effect of the drains has been great The saturation of the bund has not been stopped altogether, but it has been very materially reduced, and I must admit that I was mistaken in attaching too little value to these drains

6 The gravelling of the top of the bund, though an expensive item, will amply repay its cost by preventing percolation

7 No provision has been made in the estimate for the puddle facing to the bund at the bungalow referred to in paragraph 3 of your note abovementioned, because, under present circumstances, it does not appear necessary, the stone drains having proved so efficient Moreover, it is exceedingly doubtful when the water will fall low enough to allow this work to be done, last year was quite exceptional in the absence of rain during the south-west monsoon, and even then the toe of the revetment at this part was barely uncovered

8 The first part of the estimate, for repairs to the bund itself, amounts to Rupees 42,240, out of which Rupees 33,700 has been already expended. In point of fact this part of the estimate is rather an abstract of what has been done than a true estimate.

9. The whole of the puddling, nearly the whole of the earthwork, about two-thirds of the turfing, gravelling, and repacking of revetment, and about one-third