

(1) Number of pages _____

(2) Date of repair _____

(3) Initials of the Referencer _____

MADRAS RECORD OFFICE

Government of Madras

Public Works DEPARTMENT

G.O. No.	1300	(w)	Press
-B.P. No.			-Mis.-
Dated	8.5.		1876.

Not to be folded or roughly handled

1

Commis

*Proceedings of the Madras Government, Public Works Department,
8th May 1876.*

Irrigation

Read the following :—

No. 46 W.

No.

MEMORANDUM.

THE following notes of inspection of Irrigation Works in the Cuddapah District are submitted for the information of Government. The District Engineer accompanied me throughout the tour, and the Sub-

~~Irrigation~~

November 1875.

Collector, Mr. Gribble, was with me for two and a half weeks during the inspection of tanks, &c., in the sub-division.

2. The bund is a strong one and in fair order, but would be the better for a little attention by the villagers to the filling in of cracks and rat holes which should be made good and well tamped with crowbars. The bund appears to have been raised at some period subsequent to the first construction of the tank, as the lower part is very thick, while the upper 5 or 6 feet are of ordinary section. The waste weir is at the north end, and is 170 feet long with a sloping apron, the surface of which is plastered. It was slightly damaged during the flood of 1874, when 5 feet of water passed over it, and repairs were in progress, but the necessity for keeping the plaster damp had not been understood, and the stone used for repacking the tail of the apron is much too small. At the junction with the bund there is a wing wall of insufficient height. At the other end the escape terminates at a large boulder, beyond which is a short bit of bund; by clearing away the boulder and bund an extension of 30 feet to the weir could be secured. The drainage basin measures on the Atlas sheet 80 square miles. The actual discharge over the weir last year was about 6,400 cubic feet a second, and the maximum may be taken at from 7,500 to 8,000 cubic feet a second, and as with 200 feet of weir the depth passing over would be about $6\frac{1}{2}$ feet the extension is evidently desirable and it can be carried out at a small cost. The wing wall should be 9 feet above F.T.L., or the end of the bund above the present wing should be protected by a substantial revetment with a backing, the face stones being pointed. The maintenance of the surplus weir in repair is provided for by an Inam, said to be of the value of Rupees 500 annually; the weir is in very fair order, and the cost of its upkeep probably does not average 50 Rupees a-year.

3. This tank obtains in ordinary years a very poor supply, there being another tank a short distance above it which intercepts three-fourths of the drainage.

Cotookottah large Tank.

It is one of the numerous instances in which two tanks have been constructed where one would have done all that was practicable. To remedy to some extent the insufficiency of the supply, a catch drain was run so as to intercept a part of the supply of a Dasabundum tank to the eastward, and the chief part of the supply obtained is from this source. The road to the Mysore frontier passes over the bund, and widening for the improvement of the road was in progress on a Road Fund estimate. At the west end of the bund, surplus is discharged at a dry stone escape, the junction of which with the bund is in bad order and requires attention.

4. The bund varies much in height and the revetment is much displaced, but still suffices for the protection of the earth work. The rains of 1874 were unusually

heavy, and the depth of surplus water discharged over the weir 300 feet long was 3 feet; the water also cut a channel at the east end of the bund. About twelve years ago the crest of the surplus weir was raised 2 feet, and it is now above the level of the ground beyond the end of the bund. Additional means of discharging surplus can be provided at either end of the bund, but at the west end the water would traverse cultivated land. The tank can be made safe and efficient at a moderate outlay, but the reconstruction of the revetment when this becomes necessary, though this, it may be hoped, will be many years hence, will cost a good deal of money.

5. The surplus is discharged at a weir 450 feet in length at the east end. Left

Pedda Tippasamudrum Tank.

wing is only a revetment. Right wing is of indifferent masonry and $3\frac{3}{4}$ feet above

crest. Altogether, therefore, the arrangements for disposal of surplus are not satisfactory, and there was considerable risk in 1874, when 3 feet of water are said to have passed over the weir. The escape could be extended 200 feet at the right end. The drainage basin is about 100 square miles, and to limit M.W.L. to 3 feet above F.T.L.

$D = 300 \times 100\frac{1}{2} = 9,486$ cubic feet a second. an addition of 92 feet would be necessary,

while with 200 feet added to the weir the M.W.L. would be above $2\frac{2}{3}$ feet above F.T.L. The bund should not be less than 4 feet above M.W.L., and the settlement of the proper length of escape will depend upon the bund levels. The surplus channel has a rocky bed; the weir has three distinct sections built at different times; in the middle of the crest wall there is a curious little swami house.

Dams across Surplus Channel.—There are said to be several. The one I saw is a regular anicut and must have cost a good deal of money. It was constructed long ago for the supply of a petty field channel taking off from one flank. Should there be a demand for much expenditure on these dams in the future, it will be necessary to reduce the number to be maintained as far as possible.

6. A scheme was brought forward some years back for cutting a channel from

Supply Channel from Kundakoor Tank.

the Kundakoor tank for the supply of the Pedda Tippasamudrum and Runga-

samudrum tanks. Mr. Brickwell was employed on the investigations, and estimates were submitted to, and were reviewed in, this office, the opinion formed being unfavorable to the scheme on the information then made available. The proposed line of channel between the Kundakoor tank and Pedda Tippasamudrum was inspected, the result being a confirmation of the opinion formed from the surveys and levels. The country is rough and difficult, and the construction of an efficient channel would inevitably be very costly. Water can be taken from the Kundakoor tank only when that has obtained a sufficient supply, and it is only in favorable years that there is any surplus. The head of the channel was to have been on the east side of the Kundakoor tank, about a mile south of the bund, and to the south of the hill on which the east end of the bund abuts. It may, it is thought, be safely assumed that there is no probability of sanction being given to any scheme for a channel through so difficult a country. Even were there a certainty of water being available annually, it would

not be worthwhile to incur the expense

650 From District Engineer, No. dated
To the " " " "

16 June 70
27 June 70
The estimate, as submitted, amounted to Rupees 1,000 and it did not provide for all that was necessary to the safety of the channel. The correspondence as per margin on the estimate took place.

83,000

7. This tank is a very fine one, with a short massive bund well revetted, and is, like Kundakoor Tank.

way in which tanks were constructed under native rule. Some of the waterspread, and nearly all the catchment basin is in Mysore, and it is said that new tanks are being formed or have lately been formed on its feeders in that territory. On this point the District Engineer should make more particular inquiries, as the information available was not definite, and it is possible that what have been referred to as new tanks are really old ones which are being restored to a former state of efficiency, and though doing this may diminish the supply of the Kundakoor tank, it would be a very different thing to the formation of new tanks. It is difficult to say what the effective length of the escapes of this tank is. There is a masonry weir with its crest at varying levels, and $5\frac{1}{2}$ feet of water went over the east end in 1874; the apron is of stone, fitted with considerable care, and it stood very well, but the section, though well adapted to a site such as this, where the surplus channel runs through rock more or less decomposed, would not do so well were the soil liable to be cut away. The right wing is only $2\frac{1}{2}$ feet high with revetment above, and it will be advisable to raise the wing to $7\frac{1}{2}$ feet above crest, or to rebuild the revetment in mortar with a backing. Beyond this main weir there are three detached weirs, with uneven rocky ground in between much of which was submerged in 1874. Very ample means of disposing of surplus can be secured by levelling the ground to F.T.L., or to a little above that level, and in this way the depth passing over the masonry weirs will be reduced and they will be subjected to less wear and tear. There are two sluices in the bund, and one

Atlas Sheet 78	...	...	20 square miles.
" " 60	...	...	171 do.
" " 59	...	...	112 do.
" " 77	...	...	42 do.
Total	...	...	345 do.

length of escape required if M.W.L. be fixed at 3 feet above F.T.L. will be 1,370 feet, a length which can probably be provided without difficulty or much expense. If not a difference of 4 feet would be admissible, and a length of 890 feet would then suffice.

8. The Sub-Collector suggested the construction of an anicut across the Proposed Anicut on Paupugny.

Paupugny for the supply of the Kundakoor tank, which is situated on the right bank, a little way below the crossing of the Muddenpully and Kadiri road. There are several sites available at 1 to $1\frac{1}{2}$ miles above the crossing, and two such sites were specially pointed out by Mr. Gribble where an anicut could be built easily and cheaply on rock. The ground on either side of the bed proper is low and marshy for a distance of 50 to 150 feet, it then rises abruptly and is occupied by paddy fields which appear to be

rich and valuable. It would be requisite to carry the channel through these fields, and it is doubtful therefore whether it would be advantageous to take up 20 to 25 acres of valuable land for the construction of the channel. However, the requisite survey and levels would occupy but a few days, and a rough estimate of the cost of the scheme can easily be made. The Sub-Collector can then say whether the resulting benefits would probably be sufficient to compensate for the requisite outlay.

9. This is the last but one of a group on that tributary of the Muddoolair (an affluent of the Chitravati) which runs immediately west of Kadiri. The drainage

Panatula Tank.

basin is about 73 square miles and contains a great number of tanks, none of any great size, in subsidiary chains, but there are a dozen or more of these of sufficient importance to render it necessary to see that they are, or are made, safe.

The bund has been formed on very rocky ground, and three leaks were pointed out, one of which, where there is a cleft in the rock immediately behind the bund, will require attention to prevent risk of an accident, though it would seem from the account given by the villagers to be of very long standing. The bund should be opened from the front down to the rock, and in all probability a place will then be found where a cross wall can be constructed, which will effectually stop leakage through the bund itself or at the junction of the bund with the rock, and most likely this wall will not need to be of any great height or length. The bund in front of this wall should be carefully remade so as to be water-tight, and in repacking the revetment a backing of small stone or gravel should be allowed. The next leak to the eastward seems to be unimportant, and it is not worthwhile to open the bund in order to stop it. A little further eastward there is another leak, where the tank water is at a higher level than at present, and the revetment here may be stripped, the bund opened out from the inside slope as far as may be found necessary, and reformed with good soil, well watered and tamped.

The bund varies much in level and section. Some parts are very substantial and of sufficient height, others are low and not in good order. A minimum width at top of 9 feet and rear slope of 2 to 1 should be given where necessary. At the east end of the bund there is a dry stone pavement 105 feet long, which should be repacked as far as may be necessary to make the front row of stones throughout correspond with F.T.L., and to give an equal slope to the apron. In front of the weir crest a small bank of earth should be placed, and the stones forming the crest should be pointed to reduce leakage. The junction with the bund should be pitched to 4 feet above crest level. The principal means of disposing of surplus are at the west end, where for a length of about 400 feet irregular rocky ground has had the comparatively low places packed with dry stone in a rough and irregular fashion, and at the lowest depression a high level sluice has been inserted. What is wanted here is—

1st.—A crest wall of concrete or rubble masonry, and probably the last will be the easier to construct, a thickness of 2 feet and an average depth of about 3 feet will be ample. The rear edge should be at F.T.L. and should be 3 inches higher than the front edge; behind this wall dry stone should be packed where necessary, and elsewhere the rock should be cut away so as to be below (say 6 inches) the crest level.

Taking the area of the basin at 75 square miles, the flood discharge will be 6,370 cubic feet a second, and allowing $2\frac{1}{4}$ to $2\frac{1}{2}$ feet to pass over the weirs as great a depth as they can well stand, the proper length of weir will be about 500 feet, of which 105

$$D = 250 M^{\frac{2}{3}}$$

feet will, as at present, be at the east end, and the rest at the west end. By removing obstructions and making the crests throughout exactly at F.T.L., the discharging capacity of the weirs will be much increased.

This is the terminal tank of the group. It has an independent catchment basin of

Kadiri Devary Tank.

Total basin 116 square miles.

the Kadiri Devary tank does not nearly fill. In 1874, a year of unusually heavy rainfall, only a few inches went to waste over the surplus weir, which is 360 feet long. The weir crest wall is out of repair and should have a strong coping. The bund of the tank is for the most part very massive and much of it is more than sufficiently high, but the height is irregular, and a longitudinal section should be taken, and every part of the bund brought to the minimum level which may be fixed. The tank was at some former time badly breached at the return bund running north to the surplus weir, and it would seem that this return bund, which is not indicated on the Atlas sheet, was not a part of the original arrangement, but that the bund instead of turning northwards was continued westwards towards a low hill, the then escape being on this line. Probably the weir was carried away, and then the present arrangement was adopted. There is room to lengthen the surplus weir about 40 feet, and, as the tank was considered to be in some danger last year owing to leaks, it will be desirable to secure this extra length. At the east end there is a narrow cut in the high ground through which surplus appears at some time to have passed, and a little west of this there is a spot where perhaps 70 or 80 feet of escape could be provided over rocky ground, but the surplus from this end would pass over the cultivation. However, were the eastern escapes made 1 foot above F.T.L., it would be only on occasions of great storms that they would come into play, and then some water passing over the cultivation would do infinitely less harm and damage than a breach. Were 100 feet of such escape provided at the east end at 1 foot above F.T.L., probably with 400 feet of weir at the west end the maximum flood discharge of 8,780 cubic feet a second would be disposed of with M.W.L. at 3 feet above F.T.L. The minimum height of bund would then probably be 7 feet above F.T.L. Trees should be removed as completely as possible from the revetment, through which many are growing. Soil removed when levelling the fields appears to have been added to the bund which is enormously thick in some places.

11. A fine tank, much of the supply of which appears to remain unutilized. An old slip was repaired and made good last year. The bund is generally in good order. The surplus weir is 243 feet in length. Clear information regarding the depth of water discharged last year was not obtainable, but the weir crest was then not all at one level. The quantity of surplus was however considerable. The tank is not marked on the Atlas sheet, so its construction must have been undertaken probably some sixty or seventy years ago at the earliest. The catchment basin is 143 square miles, but the valley is banded above by the Wobladaver tank, the basin above which is 75 square miles. The maximum flood discharge from the Moothial tank basin may be taken as 10,337 cubic feet a second, and were a flood to occur when the upper tank was full probably, allowing for the action as moderators which the two large tanks would have, a depth of $4\frac{1}{2}$ feet would have to pass over the present escape of the lower tank to dispose of the water. The weir should therefore be lengthened as much

Moothial Tank.

order. The surplus weir is 243 feet in length. Clear information regarding the depth of water discharged last year was not obtainable, but the weir crest was then not all at one level. The quantity of surplus was however considerable. The tank is not marked on the Atlas sheet, so its construction must have been undertaken probably some sixty or seventy years ago at the earliest. The catchment basin is 143 square miles, but the valley is banded above by the Wobladaver tank, the basin above which is 75 square miles. The maximum flood discharge from the Moothial tank basin may be taken as 10,337 cubic feet a second, and were a flood to occur when the upper tank was full probably, allowing for the action as moderators which the two large tanks would have, a depth of $4\frac{1}{2}$ feet would have to pass over the present escape of the lower tank to dispose of the water. The weir should therefore be lengthened as much

as possible, so as to reduce the M.W.L., and the bund must be on a minimum 4 feet above the M.W.L., which may be determined. The revetment of the tank is good. A cistern has been built at the rear end of the deep sluice, and the Overseer, Mr. Taylor, said that screw gear for regulating the shutters of the three openings in it had been received; the vent openings are not at all adapted for this description of regulation, the stone masonry being very rough. There is a heavy leak in the tunnel between the cistern and the bund, and it is said that there is another leak between the head and the bund. The tank water had better be lowered and the sluice put into proper order, and this is likely to be a favorable year for attending to it. When this is done proper means of regulation should be provided. The revenue of the tank is small, and Mr. Gribble, the Sub-Collector, being desirous of having water conveyed to some waste lands about $1\frac{1}{2}$ miles to the north-west of Kadiri, an inspection of the ground which the channel would probably run along was made, and it was found that from one of the high level sluices there is a high level channel, the upper part of which is in use; but also for several miles beyond a channel was formerly in use, and that a large extent of land was terraced and carefully prepared for irrigation. It had been mentioned that much of the land under the tank was left waste, owing to the soil being unsuitable, also that the tank water was not good, &c. The land seen, however, though perhaps light and poor, showed no signs of soudoo, and bears an excellent crop of fine grass; the water also appeared to be good. The Tahsildar, who was present, on being asked said that the high rate of assessment was the cause of this land being left waste, and that similar reasons led elsewhere in this part of the taluq to the water of the tanks not being made use to the extent it might be. The ryots wish in consequence to take up waste land, the dry assessment of which would be nominal, and for the irrigation of which they would be charged a water rate. The old channel could for a very small amount be put into working order again, and it seems to be desirable that the obstacles to the irrigation of land belonging to the tank ayacut, and capable of being cultivated with facility, should be ascertained and a remedy applied. To take water to more distant and unprepared lands under the circumstances would seem to be a mistake, but as far as could be judged without levels, the channel could be extended across a low ridge to the land which the Sub-Collector says the ryots wish to take up.

12. This is an excellent little tank adjoining, and sometimes submerging a part of, the road to Royachoty. The area of

Kadiri Vitalrayen Tank.

the catchment basin is about $13\frac{3}{4}$ square miles, and surplus escapes by a cut 28 feet wide through rocky soil, even this small width also being much obstructed by boulders. The proper length of escape for a maximum depth of 4 feet of water passing through would be 67 feet, and perhaps by widening the outlet at the north end and supplementing it by an escape at the south end, where something in this way can be done, that total length may be obtained. The bund should then be nowhere less than 7 feet above F.T.L. There is a leak in the bund near the north end, apparently along the face of a mass of rock on which the bund rests. The water escaping was extremely small, but when the tank is full, the leak is stated to be of importance. The bund can be opened in front, and probably the rock will have to have a trench cut in it to make a good junction with the earthwork. A few yards to the south the rear face of the bund has slipped. The tank has a fine sluice with four great stones. There are several tanks in the basin above, all small.

7

Stannery pools

13. This tank is large and deep. It is said never to be empty, and it is a good many years since the head of the deep sluice was seen. The catchment basin

Dunnain Tank.

measures 56 square miles. There is a small surplus weir 45 feet long to the south of a rocky hill on which the south end of the bund abuts, and at the north end of this weir there is a space left which is used as a high level cut for irrigation, and here the villagers wish a sluice to be constructed, which can very easily be done, as nothing but a regulating wall and vent with a retaining on the right side of the channel will be needed. The principal surplus weir is at the north end of the tank, and the arrangements here are specially adapted to the circumstances. About 140 feet of the weir discharge direct into the rocky ravine forming the surplus channel, and the water passing over the remaining 140 feet goes into the sweet water Coontah or small tank close by; the first 165 feet of the right side of the opening leading to the small tank is a continuation of the first part of the weir, with a direction nearly at right angles thereto, and when the small tank is full the surplus weir of both has a length of about 305 feet. The separate catchment basin of the Coontah is very small, so for the 56 square miles there is $305 + 45 = 350$ feet of surplus weir. The maximum flood discharge may be taken to be 5,125 cubic feet a second, and a depth of about 2 feet 8 inches of water over the weirs will dispose of this, so the escapes

$$D = \sqrt[2.5]{\frac{Q}{56}}$$

are ample. The bund is generally of good section, but some little sectioning towards the top to an even width and level is required. Some of the revetment is out of order though still efficient as a protection. Both the deep sluices are difficult to manage, and one of them has in consequence been out of use for a long time. The cultivation under this tank is by no means as good as it ought to be. The transplanting of paddy appears to be unknown in this part of the country, and this may perhaps account for the irregularity and inequality of the crops. The Tahsildar remarked that the ryots incline preferentially to dry cultivation; that they attend therefore to that first and afterwards take up the cultivation under tanks, which is thus often deferred until the best season for it has gone by.

14. This tank is situated below the Dunnain Cheroo and receives its surplus and the drainage of about 21 square miles besides. The supply is indifferent.

Wunkamaday Tank.

In 1874 it filled, but this year it is less than half-full. The ayacut is acres { Government 302 { Rupees 1,561, { while the average cultivation of the five years { Inam 96 { " 636, { prior to 1874 was Rupees { Government 356, { corresponding to an area of about 75 acres. { Inam 26, {

The revenue of 1874-75 was Rupees 1,300. The surplus weir is about 85 feet in length, of which 30 feet are rock, and the rest artificial. It would be practicable to lengthen the weir to 190 feet, which would be none too long for the basin drained, and an estimate for such an extension maintaining the present full tank level has been prepared, but Colonel A. S. Moberly, taking into consideration the small quantity of water received in ordinary years, proposes to lower the F.T.L. about 2 feet and then a much smaller sum will suffice, it is believed, for doing all that will be necessary. The tank breached many years ago between the Pagoda hill, on which the main bund abuts, and the surplus weir, and a restoration was made in 1864-65; the bund then constructed is not of good section, the revetted slopes being much too steep, and the level much lower than that of the main bund.

8

Barren

15. The Cheyair is the name given to the river formed by the Bahoo and Punchee Nuddy which unite 2 or 3 miles to the westward of the hills which divide Cheyair above the hills.

the Raichoty from the Pullampett taluq. The drainage basin above the gorge through which the river passes has an area of about 1,480 square miles, and from the Atlas Sheet it appeared that the circumstances might not be unfavorable for the formation of a large reservoir. An inspection of the county and gorge has, however, dissipated the idea that the site is one ever likely to be utilized. In the first place the extent of cultivated ground is too large, and secondly, were the head of the gorge dammed by a bund, it would be necessary to pass all surplus under the bund—an arrangement no doubt feasible, but necessarily costly, compared with an escape over a detached rocky saddle, which latter arrangement appears to be almost essential to the construction of large reservoirs with economy. The gorge is bounded by rocky hills on either side, which in parts present vertical cliffs of quartzite chiefly, with trapped shale and appearing here and there. The bed of the river is used as a line of communication, and there is a very considerable traffic. Here and there for a short distance the track leaves the river and crosses a low spur of the hills, but for most part of the way there is no alternative but the river bed. The depth of water in the flood of October 1874 was from 15 to 18 feet. The ~~scenery~~ is in several places striking, but it is generally inferior to the Gundikottah gorge through which the Pennair passes. See

16. A great many of the tanks of the sub-division are deep. The heads of the sluices are at a distance from the bund, and in deep water the adjustment of the plugs,

Regulation of Tank Sluices.

which are used for regulating the discharge, is very difficult, and in some cases impracticable. Where the heads of the sluices have stone columns and a platform at the top, improved arrangements can be introduced without difficulty and at a small cost.

1st, the plugs should be well made with a long cone; a carefully cut shoulder which may be covered with a leather washer; and a suitable head; an appended sketch shows a plug suitable for a 9-inch plug hole. 2ndly, on the platform a small windlass should be fixed by means of which and a chain attached to the plug the latter can be raised or lowered as may be necessary. A sketch is appended, and all the parts have been designed so as to be capable of being made by village workmen when furnished with the iron and chain. No very good workmanship is needed. In some districts tank sluices having their heads out in deep water have been provided with new heads at the bund, and in cases in which the old heads have become ruinous or the tunnels unserviceable, it will generally be desirable to bring the heads back to the bund; but as, when the depth of water is great, new heads so placed cost a good deal, when only means of regulation are required to render existing sluices perfectly serviceable, no change of position need be made; but a platform above F.T.L. should be provided where there is none at present, and upon that the simple gear for working the plugs can be fixed. Stone columns are costly and difficult of erection, but coursed rubble masonry piers in cement can be substituted for columns, and if built 18 inches square at top with outside face batters of 1 in 12, they will answer the intended purpose. In this part of the country beam stones can be laid on the piers to form a platform.

17. The general impression left on my mind from the tour through the sub-division is that there is not much probability of any new schemes of irrigation being found desirable. Dry cultivation appears generally to be more popular than the cultivation of rice, and in many cases where there are fine tanks, the villagers attend to their dry lands first and treat the irrigated cultivation under the tanks as a matter of secondary importance. Though traversed by several good-sized rivers, the circumstances of these rivers are not generally well adapted to irrigation under river channels without the aid of tanks, and the character of the country is not favorable to the construction of tank supply channels at a small cost. On the whole, the larger tanks are substantial works requiring but moderate improvements to render them safe and useful for the irrigation of the lands under them to the full extent of the average supply of water available. Petty tanks are extremely numerous, and are in hundreds of cases so small as to be individually of very little importance. The Dasabundum tanks, moreover, are numerous, and in some parts of the country the group in one catchment basin is composed chiefly of tanks of this class, and this circumstance renders it difficult to deal with the groups effectively. The abundance of stone renders it comparatively easy to provide tanks with adequate escapes, and it is desirable that, as far and as fast as possible, the tanks should be taken up in groups, and all their requirements attended to. It may be noticed that the requisite improvements to Dasabundum tanks will the more readily be secured if it be remembered that the Dasabundumdars should be held liable for the proper maintenance of such tanks up to the standard which was deemed necessary when the tanks were made over to them, and that improvements, such as adequate escapes, regarding which nothing was known at that time, should not be demanded of them when the construction of these involves an expenditure bearing more than a fair proportion to the revenue. The right of Dasabundumdars in other districts to be treated considerately has been recognized, and all that can be demanded of them is the fulfilment of the conditions under which the tanks must be concluded to have been made over to them to be by them maintained. It is true that in numerous instances these conditions have not been properly attended to, but it will facilitate the execution by them of the work which they should be required to do, if that which is now known to be necessary, but which they are under no obligation to carry out at their own cost, be not demanded of them, but rather promptly executed at the cost of Government. It is not anticipated that the cost of the improvements chargeable to Government will be very heavy. These improvements will consist chiefly if not entirely of—*first*, the enlargement of escapes, and the escapes of petty tanks may be of a very simple kind, *viz.*, dry stone pavements with a revetment to form a wing; *secondly*, the construction of sluices to supersede cuts which are attended with danger.

Though there is apparently no opening of importance for materially increasing the area of irrigation in the sub-divisional taluqs, there is here, as in most parts of the Presidency, opportunity for the careful and intelligent treatment of the existing irrigation works, and for obtaining from them an increase of irrigating duty. By dealing with them, as far as possible, in groups, their real circumstances and requirements will best be ascertained, and it will doubtless be found that there are a good many tanks which are unnecessary, and the lands under which may more successfully

and conveniently be irrigated by the better circumstanced tanks of the same group, with or without the enlargement of these.

On many of the rivers and streams there are anicuts which appear to have been multiplied without due consideration of necessity in days when this excessive increase of number was a matter in which the ryots cultivating under the channels and tanks connected with them were alone interested, seeing that their first cost and subsequent maintenance devolved upon them. Now that the circumstances have entirely changed, and that the whole cost of keeping such works efficient falls upon Government, it is necessary to bear constantly in mind that an existing irrigation work may not always afford the best or most economical means of irrigating a given area of land, and that, when this is not the case, the best arrangements should be ascertained and adopted. In this part, then, of the Cuddapah District, there is abundant work, by no means devoid of interest, for an energetic and painstaking Range Officer, who may render good and valuable service by taking care that the funds placed at his disposal are expended only upon works which should be maintained, and in the manner most suitable to the requirements not only of individual works, but also of the whole of the works which are more or less connected, either from forming numbers of a group, or from drawing their supply from the same sources. *me/*

18. This tank lies to the east of the railway, and its supply crosses the latter.

Ootkoor Tank.

The north end of the bund is close to the railway, at which end there is a good surplus weir 170 feet long. The other end of this north bund terminates at a surplus weir 150 feet long which abuts upon a rocky hill. This bund is fairly level and is revetted; the stone work has sunk somewhat. The bund at the junction with the weir is revetted in lieu of a masonry wing. The east bund is not very level and is not in good section. Here there is a third weir 150 feet long, the dry stone of which is not well packed; it has a curved drop in rear. The drainage basin is not very well defined throughout on the Atlas Sheet, but its area would seem to be about 70 square miles, consequently with 470 feet of escape, supposing the crests to be all at F.T.L., the difference between F.T.L. and

$$D = 450 \sqrt{70} = 10,890 \text{ C. feet a second.}$$

M.W.L. would be about 43 inches. This is rather an excessive depth of discharge, and it would be better to provide an additional 150 feet of escape, if this can be done at a small cost, which would restrict M.W.L. to 36 inches above F.T.L., and the proper level of the top of the bund would then be 6 feet above F.T.L. The tank with its present escapes will, however, if the latter be slightly improved, as for instance by substituting a wing wall for revetment at the east escape north bund, &c., be safe if the bund level be maintained at 6½ feet above F.T.L.

19. This is a large tank and is supplied by the Poolungair. The latter though draining a large extent of country is only

Polur Tank.

just traceable below the head of the tank supply channel near Ootkoor. The bank of the supply channel and the south end of the south bund of the tank are continuous. There is a surplus weir 120 feet long in the channel bank and it was proposed to lengthen it to 170 feet; but it will be as well to make its length 250 feet, as this can be done at a small expense, and it is much better to ensure the bulk of the surplus being got rid of above the tank. The south

bund is very crooked, and of irregular level and section; some ramps are required for village tracks. It terminates at a masonry weir 81 feet long which had just been repaired, and this abuts on a rocky hill. The bund to the north of the hill is much more substantial and carries a cart road. The revetment varies, and some of it is a good pitching on a flat slope.

20. The Cheyair is a narrow well defined river, and runs through a rough hilly country until it reaches a point about 4 miles above the crossing of the railway,

Cheyair Embankments.

and to within 2 miles of the latter its flood waters cannot extend far from the bed proper. On the south side a rocky

South side above Railway.

promontory $1\frac{1}{2}$ miles above the railway

on which a pagoda stands, and through which a small shrotriem channel has been cut with much labor, is the eastern limit of the high ground close to the river. Between this point and the railway there are the heads of several irrigation channels which run through ground liable to be submerged in all high floods, and which was submerged for a considerable distance southwards during the flood of October 1874. All the water, however, must return to the river between pagoda point and a hill about 1 mile east of the railway on which there is a railway bungalow. There was formerly an embankment which ran from the railway westwards for a short distance, and then turning southwards until it reached the high ground. This flood bank was of irregular level and of insufficient height, and it was entirely or almost entirely submerged in the flood of 1874; but the part parallel to the river was not much injured, it having been ~~found~~ of good soil and revetted on the river side. The best arrangement would be to reform at a proper level* the part of this embankment which runs

* 4 feet above the flood of 1874.

parallel to the river, and to continue it westwards as nearly as circumstances will allow parallel to the axis of the river; *secondly*, to abolish the several independent heads of the river channels, heads which are by no means efficient, and which have to be carried out far into the river, and to substitute one head, with a head sluice, as near to pagoda point as the shrotriem channel will allow; possibly, it will be desirable to carry up the head in the bed of the river by means of a stone corumbao or spur for a short distance. The left bank of the channel would then serve also as a flood bank for the greater part of the distance. If any improvements be decided to be necessary, the above is the direction they should take; but the flood of 1874, which was a very extraordinary one, did but little damage to the lands herabouts, and none to the railway embankment, and it will depend a good deal upon the cost of restoring the channels which were filled up by the flood and upon their general efficiency with their heads as at present circumstanced, as also upon the estimated cost of the improvements whether matters should be left as they are or not. Nothing is required above the Patur tank supply channel.

North side above Railway.

The head of this channel is just below an

island, and in heavy freshes the water passing to the north of the island submerges the land between the hills and the head sluice of the channel, and although there was a revetted bund connecting the sluice with the high ground, this being of inadequate height was swept away and much damage was done both to the channel and to the neighbouring lands. The head sluice is simply a straight wall with a vent in it; but

with revetments above and below and small water-wings in front to form supports for a shutter platform, it may be rendered efficient at a small cost. The wall and the flood bank to connect it with the high ground to the north should be 4 feet above the flood of 1874.

The next channel situated a short distance further down is the Patur irrigation channel. Between the two channels there are signs of there having been a revetted embankment, as there is a lot of small stone lying along the river margin; but, if so, the bank has been entirely washed away. The right bank of the Patur tank channel may be formed into a flood bank, and then a bank parallel to the river may be carried on to the Patur irrigation channel, it being desirable to prevent flood waters finding an entrance to the cultivated lands in rear. The head sluice of this channel is a wall with a vent, and it has substantial revetments at either end, so it can easily be made to answer its purpose efficiently. Below this point there are four channels:—

The Nagareddypully river channel, which has an old head sluice raised with rubble. It should be carried up to 4 feet above F.L.

The Nundaloor tank supply channel.

The Nagareddypully spring channel, Government

Do. do. do., Dasabundum.

It is not clear that any embanking is absolutely necessary below the head of the Patur irrigation channel, beyond such exclusion of flood water as may be secured by strengthening the right bank of that channel. The river in floods spreads some distance to the northward, but it cannot go far, and as the water must return to the river to the westward of the hill lying three-quarters of a mile below Nundaloor, there can be but a slight current, and the benefit resulting from a flood bank would probably not compensate for the cost of construction and maintenance. The survey and levels available at the time of my visit were not sufficiently complete to enable a final opinion to be formed, but it appeared probable that if anything in the way of exclusion of flood water from this section were found necessary, it would best be effected by forming banks about at right angles to the river to the high ground, so as to limit the effect of floods to a still water submergence which would do good rather than harm.

The bed of the river may be much improved by regulation of its width by means

River above the Railway.

of nanul plantations. At present it is much wider than is necessary, and, in the

interests of the railway bridge, it is desirable that a defined channel of adequate width should be substituted for the present undefined and almost untraceable margins, for in this way the current may be made to approach the bridge almost, if not absolutely, at a right angle, and some approximation to an equal discharge through the several spans of the bridge may be secured.

It will be desirable also to fix a normal width for the river below the railway bridge,

River below Railway.

and a good alignment on either side can be readily obtained by means of nanul

plantations. A little of this grass is available in this neighbourhood, and the supply can be rapidly increased, if plantations be established in favorable situations in the river bed in the first instance. It is, moreover, necessary to correct the alignment of the river which has been departing gradually during a long period from the proper line. The rocky hill on the north or left bank three-quarters of a mile below Nundaloor has acted as a great groyne, and has caused a set of the river to the south bank, to which

cause the great bay at the infall of the Poolungair is probably due. By re-action there has been a considerable erosion on the north bank above Tungatur, and the river for a distance of some 10 miles is very abnormally wide and consequently unmanageable. By judicious nanul plantations a great deal of destroyed land may be reclaimed and the efficiency of the river at the same time increased.

No embankment is required between the railway and the railway bungalow

Right bank below bridge.

hill just below the hill there are the heads of two irrigation channels, and for the

protection of these a very irregular wall to act as a flood bank had been recently thrown up, the core being of shale chips and the faces of rubble. Mr. Schoury, the Range Officer, knew nothing about this work, which probably therefore had been carried out by the villagers interested. The work was incomplete, and to be of real service the wall should be 4 feet above flood level.

No embankment is necessary between the railway and the rocky spur $1\frac{1}{4}$ miles below bridge on this side. Immediately

Left bank below bridge.

below this hill is the head of the Yellamra

pully channel which has a head sluice wall; a little further down there are the heads of two channels which also are provided with head sluices.

There appears to have been no spill or none of importance above Tungatur, and the high ground is in this part nowhere far from the river. It will be desirable to improve the existing embankments of this part, and no heavy expenditure will be requisite. Below Tungatur, however, the river found its way in, especially on the line of the Potapee tank channel, and did a good deal of damage, and for the future protection of this section, an efficient embankment appears to be needed. Potapee is about 4 miles below Tungatur, and protective works may have to be carried somewhat further down, but the hills come close to the river again at less than 2 miles below Potapee.

I had the opportunity of discussing the subject of these flood banks with the District Engineer, and the direction in which additional information was needed to enable a reliable opinion to be formed of the requirements was indicated to him.

21. Gauges should be placed at or close to the low level sluice of all important

Gauges at Tank Sluices.

tanks, so that water levels may be observed and recorded whenever the tanks are

inspected. Where sluices have stone columns reaching above F.T.L. or to nearly that level, the gauges can be attached to one of the columns. In other cases a pile may be driven and the gauge attached to it. The gauge should be clearly legible from the bund. The maximum water level of each year should always be noted; and even when the village officers will not take the trouble to keep a weekly or monthly record of water levels, they will, it is hoped, be able to state the maximum. The zero of all such gauges will be the sill of the deep sluice.

22. In connection with this subject it may be mentioned that it seems to be not

Registration of Tank water levels.

unreasonable to require the Village Cur-

nam, or other officer whose duty it may be to see to the regulation of the water distribution, to note down the water level each time he visits the tank. In cases in which the tank may be at a considerable distance from the village some small remuneration might be given, also whenever any special and more frequent registration may be required; but, generally speaking, the

task of writing down the reading of the gauges some six or eight times a-year would be too easy to make it necessary to pay for its being done. The data which the gauge readings will hereafter afford will be of considerable value for many purposes connected with the management of tanks.

23. Some time since (1874, Circular No. 61) two formulæ for calculating flood

Flood Discharges from Catchment Basins.

discharges were communicated to the members of the department generally, and

it was suggested that one of these should at once be used practically in determining the required dimensions of the surplus weirs of tanks. It was necessary, in the absence of sufficient data, to fix roughly on the co-efficients to be used with the formula. An examination, from time to time, of results, led several officers to believe that the formula

$$D = CM^{\frac{2}{3}}$$

introduced by the late Major Ryves gave too large discharges for small areas, and

perhaps too little from areas of 100 square miles and upwards. It was further known that the selection of co-efficients for application to particular localities was dependent upon maximum rainfall in a limited time and upon the character of the basin drained, and that without taking these into account, no formula would give, even approximately, reliable results.

Colonel A. S. Moberly has turned his attention to the subject, and he has for the Cuddapah District collected sufficient data to allow of at any rate a first approximation being arrived at. He has worked out the co-efficients applicable to Colonel

$$D = CM^{\frac{2}{3}}$$

Dickens' formula for different parts of the district, corresponding to the ascertained

maximum rainfall for a period of nine years, and as 1874 was a year of remarkable rainfall, he has had data to work with which could not prior to that year have been so well obtained. The procedure in fixing the co-efficients for practical use has then been as follows:—

Five square miles have been taken as the standard area, and it has been assumed that the maximum probable rainfall may exceed the maximum known rainfall by about one-half, the co-efficient for this larger rainfall has then been ascertained for the standard area, and has been used for other areas similarly circumstanced.

24. The ranges of hills in the district divide it into tracts of country having

Division of the District by rainfall characteristics.

somewhat distinct characteristics as regards liability to rainfall. As far

therefore as a judgment can be formed from a consideration of the configuration and rain registers jointly, the following grouping of the taluqs has appeared to be reasonable:—

Taluqs.	Maximum recorded Rainfall.	Co-efficients.
Cuddapah	5.70 inches	250 flat country.
Prodatur	4.25 "	300 steep "
Jummulonadaga	6.20 "	350 hill "
Poolavaindla	6.00 "	
Budwail*	5.40 "	
Sidhout	13.45 "	400 to 500.
Pullumpett	10.45 "	
Royachoty	8.41 "	
Voilpad	5.50 "	300 to 400.
Maddenpully	7.60 "	
Kadiri	3.50 "	200 to 300.

* Though the rainfall in this taluq was comparatively small, it is probable that in some other year it will equal that of the taluqs with which it is grouped.

Amman

16

The co-efficient used with Colonel Dickens' formula in some parts of Upper India is 825; so it will be seen that even when the rainfall in Cuddapah is heaviest, only about five-eighths of the maximum discharge considered possible in Upper India is anticipated. *re*

It is to Colonel A. S. Moberly's credit that he has been the first District Engineer, so far as is known to this office, who has endeavoured to give practical effect to the instructions issued with a view to the determination on adequate data of questions connected with rainfall and of the requirements of Irrigation Works in connection therewith.

OOTACAMUND,
20th April 1876.

Exd. E. C. Shunker.

Lt.-Col., R.E.,
Chief Engineer for Irrigation.

Hy. 13/5

P. H. 1876 Department

803779

From

The Chief Eng^r for Irrig.

Date d 20th April } 1876.
Received 25th May }

24th H.

Notes on inspection
of Irrigation Works in the
Cuddapah District.

PUBLIC WORKS DEPARTMENT

MINUTE by the Hon. SIR W. ROBINSON, K.C.S.I.

G.O., No. 1,300, dated 24th May 1876.

Irrigation Works, Cuddapah District.

No.

THE Chief Engineer for Irrigation seems to be under some misapprehension about the origin of Dasabundum tanks if I understand him aright. Dasabundum tanks are due to the enterprise of private parties or bodies of persons for the benefit of their own lands. Native Governments encouraged such private exertion and enterprise by remitting in part the regulated wet-revenue demand, and imposing a beneficial rate in consideration of the outlay of private capital and up-keep of the work. This condition has gradually come to be treated as if it were an Inam status carrying certain public obligations of maintenance, &c. This is not the case. Dasabundum tanks are, as a rule, private property in respect to which the Dasabundumdars may exercise their own judgment. They are not "tanks which were made over to them"—the Dasabundumdars—by the Government of the day, as I conceive the Chief Engineer for Irrigation assumes.

23rd May 1876.

(Signed) W. ROBINSON.

Hebert (.)

Sketches alluded to in para 16 of Memo
from Chief Engr: for Irrigation, printed with
G. O. No. 1300 dated 24th May 1876.

E.H.

20

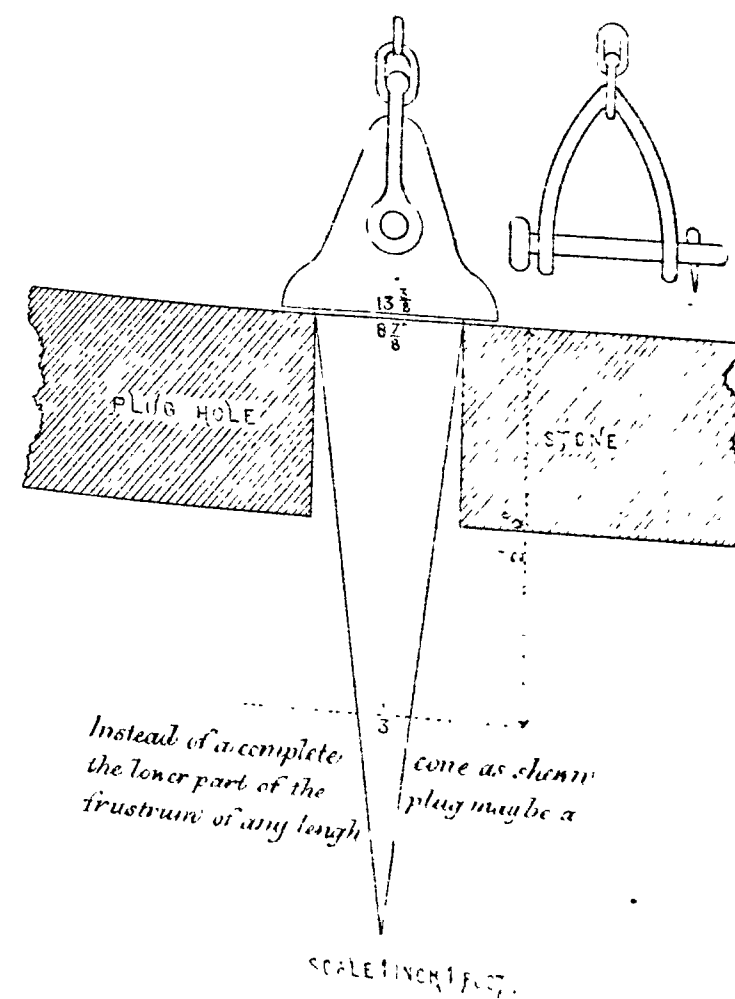
1876 May 15 - 1876

5/6/76

1876 May 15 - 1876
1876 May 15 - 1876
1876 May 15 - 1876
1876 May 15 - 1876

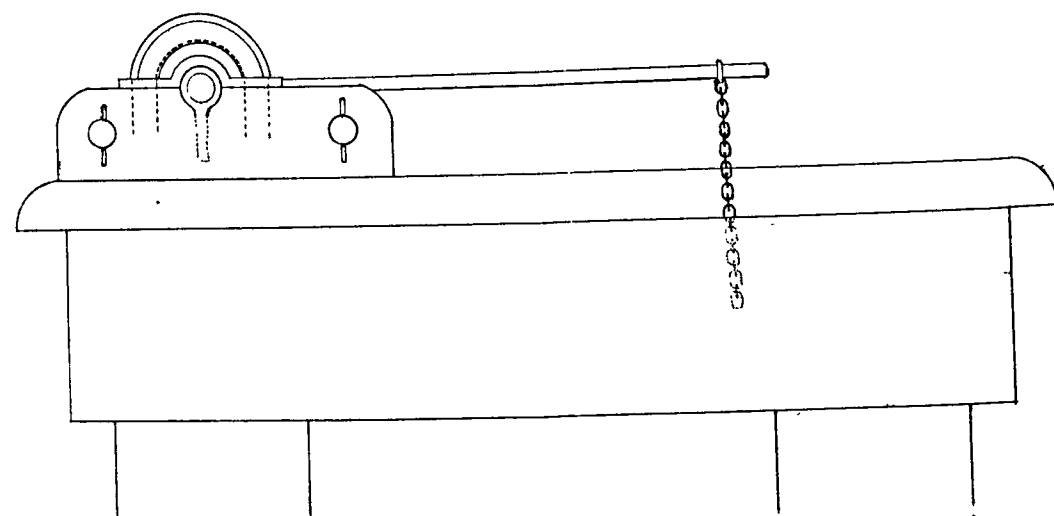
1876 May 15 - 1876

PLAN FOR A 9 INCH DIAMETER HOLE.



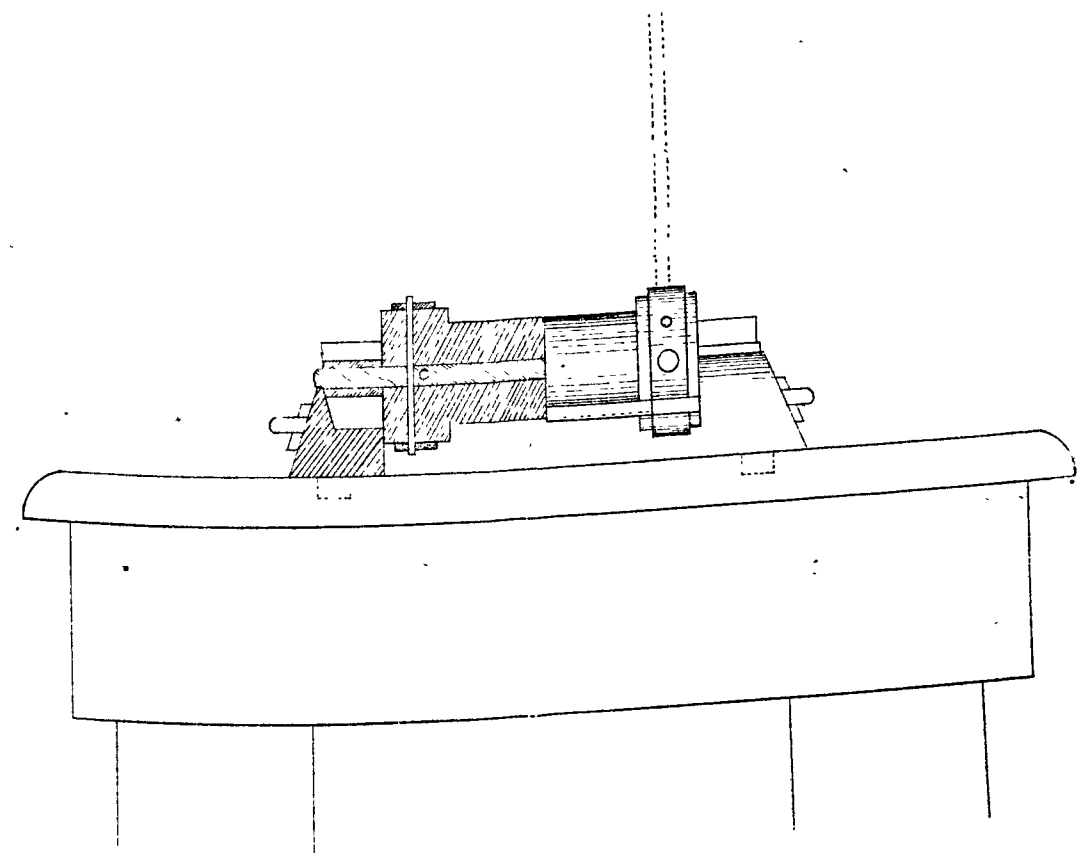
SIDE VIEW OF WINDLASS.

SCALE 1 INCH TO A FOOT.



HALF SECTION AND HALF FRONT VIEW OF WINDLASS.

SCALE 1 INCH TO 1 FOOT.



INDEX.

	Para.
Chinna Tippiasamudrum Tank	2
Cotookottah large Tank	3
Rungasamudrum Tank	4
Pedda Tippiasamudrum Tank	5
Proposed Channel from Kundakoor Tank for the supply of Pedda Tippiasamudrum and Rungasamudrum Tanks	6
Kundakoor Tank	7
Proposed Anicut on Paupugny near Tenddum	8
Panatula Tank	9
Kadiri Devery Tank	10
Moothial Tank	11
Kadiri Vitalrayen Tank	12
Dunnaincherroo Tank	13
Wunkamaday Tank	14
Cheyair River above the hills in connection with reservoir site	15
Regulation of Tank Sluices	16
Irrigation in Taluqs of sub-division... ..	17
Ootkoo Tank... ..	18
Polur Tank	19
Cheyair embankments	20
Gauges at Tank Sluices	21
Registration of Tank Water Levels	22
Flood discharge from catchment basins	23
Division of District by rainfall characteristics	24

Print with type
Minute.

The Chief Engineer for Irrigation seems to be under some misapprehension about the origin of Desamudum Tanks if I understand him aright. Desamudum Tanks are due to the Enterprise of private parties or bodies of persons for the benefit of their own land &c. Native Government has encouraged such private exertion and Enterprise by remitting in part the regulated water-revenue demand and imposing a benevolent rate in consideration of the outlay of private

private Capital and
upkeep of the work. This
Condition has gradually
come to be treated as
if it were an Inam
State. Carrying certain
public obligations of
maintenance etc. This
is not the case; Das-
= Vandam Tanks are
as a rule private
property in respect
to which the Dasavandam
= dars may exercise
their own judgment.
They are not Tanks
which were made
over to them - the Das-
= vandam - by the
Govt. of the day, and I
conclude the Chief
Engineer for Irrigation
assumes.

28/6-1888

26
Order No 46. W.
Para 1 + 2 as amended
Para 3 - omit
New para 3. The attention of the Collector
will be drawn to the remarks in
para 11 of the notes on the
~~irrigation~~ non-utilization of the
wells, the water stored by the
Moolthal Tank and the surplus
canals; in para 13 on the irrigation
cultivation under the Dasavandam tank
also in para 20 on the ~~irrigation~~ channels
under the 1st class, and in para
21 on the fiscal bearing of any
changes that may be proposed
should be carefully sifted.
As to the remarks in para 17
on Dasabundam tanks, it is not
clear that the Chief Eng. has rightly
understood the circumstances and
position of Dasabundam, but the
Government ~~concludes~~ agrees with
para 1 of the report.

Unit in thinking that the owner
of such tanks cannot be required
to carry out special improvements
at their own cost.

Para 5 former 4
in 6 do 5

19/5

3779

Line 10/5

Under the memorandum

W40 W, to be sent to His Grace

the Governor.

19/5

Public Works Department.

PROCEEDINGS of the MADRAS GOVERNMENT.

UNDER date the

READ the following:-

From the Chief Engineer for Irrigation
20 April 1911

8/11/11
19/11/11
19/11/11

MSL
14/5/11
19/5/11

This notes of an
inspection to be made
in the Buddapak
District in November
last by the Chief
Engineer for Irrigation,
contained in the
foregoing memo-
randum will be
communicated to
the District Engineer
for information
and guidance.

2. As it appears
(para 6) that the

country which would be traversed by the proposed channel from the Kundakoor tank for the supply of the Pidda Tip-pasamundrum and Lungasamundrum tanks is rough and difficult, and that the cost of this channel would, taking the character of the water supply into account, be out of proportion to the resulting advantages, it will not be desirable to bring the estimates forward for sanction and the scheme will be given up.

3. Further enquiry

The Col. attention to the Dam
P. 11 & 12 of this report also
describes the extent of the
irrigation scheme and its
costs. The present hearing of
our claims proposed
is carefully sifted.

The Chief Engineer of
Darsamundam tanks
and corrects as follows
can gate it - the tanks
were the construction of
private parties under
the native Government
of Darsamundam
of Darsamundam
enterprises, permitting

appears to be necessary
(para 7) as to what
is being done on the
feeders of the Kundakoor tank in the
Mysore Territory,
and as to the scope
and character of
the operations be-
lieved to be in
progress there in
connection with the
impounding of water
for purposes of
irrigation.

4. It is noticed that
the Chief Engineer for
Irrigation, while con-
sidering that the tanks
of the subdivision do
not present a field
for the material ex-
tension of the area
of irrigation by new

projects, is of opinion
that there is much
valuable and interest-
ing work for the
Range officers to do
in the improvement
and more effective
management of ex-
isting irrigation
works, and it is
hoped that, under
the general or particu-
lar instructions of
the District Engineer,
steady progress
in this direction
will be secured.

His Grace the
Governor in Council
notices with satis-
faction Colonel
A. S. Maberly's
successful endeavours
to obtain more re-

The regulated demand
is a form that we have
now got to treat as an
obligation carrying certain obli-
gations of maintenance.
26. As to the correctness
of this position the Dasa-
vandom Tanks are private
property in respect of which
the Dasa-vandom dars may
exercise their own judgment
they are not "tanks" which
were made over to them -
the Dasa-vandom dars of
Jatna the Chief Engineer accordingly
for of the day. Has the Govt
agreed with the Chief Engineer
that the Dasa-vandom dars
shall be applied to Dasa-vandom
Tanks at the lands of the
owners the Dasa-vandom
dars.

For the District Engineer
Juddapah.
Chief Engineer for Dist.
Revenue Dept.
Board.
Collector of Juddapah.

liable data for the
proper treatment of
irrigation works in
connection with the
extent and character
of the rainfall in
different parts of
the District. The
result will be the
more accurate de-
termination of the
real requirements
of each works, and
the restriction of
expenditure on
repairs and other
surplus works to
that really necessary
for safety.

To The District Engineer
Juddapah.
Chief Engineer for Dist.
Revenue Dept.
Board.
Collector of Juddapah.

By 25/4
13/5
with proof

No 1300

Public Works Department.

PROCEEDINGS of the MADRAS GOVERNMENT.

UNDER date the 24th May/76

Read the following:—

From the Chief Engineer for Irrigation } M.H. No. 46 N. 7 20 April/76.
Minute by the Hon. Sec. } M.E. 23 May/76.
Wm. Robertson M.C.S.D.

These careful and interesting notes of an inspection tour made in the Cuddalore District in November last by the Chief Engineer for Irrigation, contained in the foregoing memorandum, will be communicated to the District Engineer for information and guidance.

2. The proposed

M
23/5

Recd. 22/5/76 Otda 24/5/76
Cii-16-5-76 Otda 22/5/76
A.L. Shub. 20 May

channel from the
Kundakoot tank
for the supply of
the Pedda Tippasa-
samudrum and Runga-
samudrum tanks
through a rough
and difficult country
will be given up.

3. The attention
of the Collector
will be drawn to
the remarks in para
11 of the notes on the
non-utilization of
much of the water
stored by the Mos-
thial tank and the
supposed causes;
in para 13 on the
indifferent cultivation
under the Durnain
tank and also in

para 20 on the irrigation
channels from the
Cheyari; in regard
to these latter the
fiscal bearing of
any changes that
may be proposed
should be carefully
sifted.

4. With regard
to the remarks in
para 17 on Dasabun-
dimi tanks, it is not
clear that the Chief
Engineer for Irrigation
has rightly under-
stood the circumstances
and position of the
Dasabundundars; but
the Government
agree with him in
thinking that the
owners of such tanks

as real requirements
to of such works, and
in the restriction of
the expenditure on escapes
and other surplus
works to that really
necessary for safety.

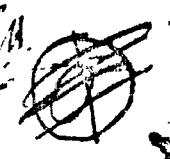
May 20/5

To The Distt Engr. Cuddalore
" Ch. Engr. for Distt
" Revenue Dept.
" Board
" Collector of Cuddalore
Dated 15/6/16

55
55
6 without minute
17 copies with minute

22-12-11 B. II ✓

3779/11



Govt. of Madras
PUBLIC WORKS.

The H. B. Cuddapah

Original

Date
Filed
Recd

24th May 1876 No. 1300

423/24

No. 1.

But no stop
14-6-76

Irrigation Works -
Cuddapah D.

Passing orders on
Memorandum by the
Chief Eng^r for irrigation
containing notes of an In-
spection tour made in the
Cuddapah D. in November
last.

N^o 423/24