

(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.	284	Press	<i>Original</i>
B.P. No.		Miss	
Dated	2 . 2 .	195	1875

Not to be folded or roughly handled

*Proceedings of the Madras Government, Public Works Department,
2nd February 1875*

Read the following papers —

No 999 C.

No 43

MEMORANDUM

A LETTER No 2,890 of the 17th November, from the Superintending Engineer, Chingleput, with its enclosure, and a memorandum of instructions sent to that officer in reply, are submitted for the information of Government. These papers refer to the recent floods in the basin of the Chembrumbaukum tank, and to the damage sustained at the Koratur anicut on the Cooum which supplies it, as also at the Kesaveram anicut on the Cortihar which, through the old Bungairoo, supplies the Cooum.

CAMP, CHINNAPENPUTTY,
2nd December 1874

(Signed) JOHN MULLINS, Lt-Col, R E,
Chief Engineer for Irrigation.

No 43A From Colonel F. J. MOBERLY, R E, District Engineer, Chingleput, to Lieutenant-Colonel J. MULLINS, R E, Chief Engineer for Irrigation, dated Guindy, 17th November 1874, No. 2,890

I HAVE the honor to enclose copy of a letter from the Executive Engineer, Mount Range, regarding the discharge during the late rain from the weirs of Chembrumbaukum tank supplemented by the breach beyond the Rooshi, which was left weak fortunately from 1872, and was so much scoured that its average height was 2.25 feet below the crest of the weirs generally.

2 The water rose to 3.24 feet above the crest of the Koratur dam, as reported in my No 2,606 of 27th October 1874. The bank north of the north wing wall is said to have been cut, in sheer self-defence, by the inhabitants of Manapakam. I think it would be well to re-open the three sand sluices about 100 feet long in its wall, and to fit them with shutters; we must also either lengthen the weir or build a head sluice at Kesaveram. There in spite of the lengthening of the weir by 60 feet, so much water came into the head of the channel that it has breached 212 yards of the dividing bank—72 yards near the head wall, which has been much shaken, and 140 with the east wing of the surplus weir; a considerable breach too was made near Perembaukum, but the water which passed out of it returned to the Cooum a mile or so lower down.

3. I have desired levels and cross sections to be taken, and hope shortly to be in a position to report more definitely on the subject.

From Captain A. C. SMITH, R E, Executive Engineer, Mount Range, to Colonel F. J. MOBERLY, R E, District Engineer, Chingleput, dated Mount, 4th November 1874, No 2,105

WITH reference to the Chembrumbaukum tank, I find I was mistaken in my calculations, or rather in the data, on which they were based in my letter No 222 of 29th April last.

In the first place the average head or level of 82.88 is incorrect. I arrived at this in this manner: the tank rose to 84.15 but, I understood, fell very rapidly, so I thought it fair to take an average level which I did throughout the highest week's register, and, secondly, I was not aware that water escaped through a cut made by villagers near the Rooshi waste weir, which enlarged to 186 feet in length. I find now, on further examination of this register here, that *after this cut* had been made the water again rose to 83.65, and this, I think, may be taken as the highest level the floods of 1872 would have attained had the gap been made in the beginning of the rains.

Proceedings of the Madras Government, Public Works Department,
2nd February 1875.

With this head then we get the following discharge, viz —

Captain Smith uses a high co-efficient, but it does not affect the argument — F J M

	1	2	3	4	Long h.	Crest level	Head
	Ponneammam Weir	Thattan do	Rooshi do	Opening enlarged to	250	80 15	3 5
					114	80 65	
					250	80 65	3 0
					186 to level	80 65	

No 1 gives a discharge of $230 \times 1,400 = 322,000$ cubic feet per minute
Nos 2, 3 and 4 do $580 \times 1,110 = 643,800$ do

Total quantity of discharge in 1872 ... 965,800 do
I will now give the discharge which actually took place this year on the 25th October
The tank water rose till it reached 84 9) and the state of the calingulahs is as under—

	1	2	3	4	5	Length	Crest level	Head
	Ponneammam Weir	Do	Thattan do	Rooshi do	Opening again enlarged to	24	81 40	3 5
						206	82 40	
						114	82 40	2 5
						280	82 40	
						280	80 15	4 0

No 1 gives a discharge $24 \times 1,401 = 33,624$ cubic feet per minute.
Nos 2, 3 and 4 $600 \times 815 = 507,000$ do
No 5 $280 \times 2,216 = 620,480$ do

My proposed arrangement, based upon the incorrect data given above, will not nearly suffice, unless we are to leave out the canal portion of the river branch, but as it has done so in these floods it may do so again, and we ought therefore to provide for it, my arrangement proposed 950 feet length of calingulah with a head of 2 feet (which I am satisfied is as far as we can go with comfort to the tank), and this will only give a discharge of 374,000 cubic feet per minute, just about half the actual discharge on 25th October last.

As far as I can ascertain the only quantity coming down the Pungaroo into the tank was 214,620 cubic feet per minute, and this I think an outside quantity (this I have previously obtained by taking the flood level section of the channel and its actual slope of bed, then came into the channel partly through the breach in the tank and partly over the new head sluice).

But only to Sreegongah — F J M

Now, deducting this amount from that shown as actually discharged over calingulahs we get $1,161,000 - 214,620 = 946,380$ cubic feet per minute for the quantity supplied by local drainage.

I may as well here remark that this is about one-fourth as much again as that obtained from the formula for rainfall.

$$D = C \times \sqrt{M^3}$$

when D = cubic feet per minute C 562 5 according to locality and M = 10 9 square miles, the outside measurement of the ground contained S and P of the Cooum as far as the Clebrum-bankum tank on the S. and do not to a line on the south from southern extremity of Cooum tank to Sreeperumare and to Clebrum-bankum tank.

This worked out gives an amount of 765,000 cubic feet per minute, which is about 1/3 of the quantity actually discharged for 10 hours over the weirs. To return to the original subject, there is no doubt that the 1,161,000 cubic feet per minute is a great over-estimate.

It must be remembered that a large quantity of the rainfall also occurred through the Channayal canal which breach, so that the 946,380 cubic feet per minute did not represent the whole of the drainage from the catchment basin.

but, on the other hand, this might have been increased if the Channayal had been more extensive, and again if the river breach into the Pungaroo had been more extensive.

Proceedings of the Madras Government, Public Works Department,
2nd February 1875.

So all things considered, I do not think we shall be over the mark if we allow for the free outfall of 1,000,000 cubic feet per minute as a certainty with a rise only 2 feet above present calingulah level. Before going any further I must state why I consider 2 feet as the proper level, or rather the outside amount we can allow in excess of full tank level. During the recent floods the top of the front slope as already reported (*vide* my letter No 2,050, dated 2nd instant,) was in places very much cut up by the wash of high waves above the revetment, now this revetment is only 4 feet higher than calingulah crest, the consequence was that with 2 5 feet on calingulah the waves washed right over the revetment, and not only destroyed the front slopes above, but also the backing behind the stones, thereby endangering the revetment itself. I may here mention that the cost of raising the revetment 2 feet in height will be about Rupees 2,400 per mile, including gravel backing and puddle, and we should require about 3 miles of this work if any. It must also be remembered that the top of the bund is only 4 feet above that of the revetment. This wash therefore not only might tend to destroy the bund and endanger the bank, but it must always in high floods cause great expense. Therefore I fix 2 feet as the outside limit for the tank to rise above crest level.

The question then is how to allow of a free discharge of 1,000,000 cubic feet per minute, and keep the tank down to 2 feet above present crest level or to 84 40 above mean sea level.

1st — This might be done by the extension of the calingulahs, but an enormous extension will be necessary. Allowing for the Rooshi extension as already estimated, which will make a total length of 950 feet with a 2-feet discharge of 541,500 with C = 628 578,000 cubic feet per minute, and for the

1,000 feet flush escape already talked of at south-west extremity of tank with a 1 foot discharge of 214,000, we shall only secure a total about 1/3 of the 1,000,000 required, and this work would cost about Rupees 9,000 or 10,000.

2ndly — We might extend the Rooshi as proposed, making a total of 950 feet, and cut down half of this length in gaps of about 8 feet, to be filled with self-acting shutters to open directly the 2-feet head was attained to a depth of 2 feet below crest levels, by this means we would get a discharge of 1,100,000 cubic feet per minute at a cost of Rupees 7,000 or 8,000.

3rdly — We might extend the Rooshi calingulahs 1 foot below present level and get, with flood of the tank, cut down the whole of the calingulahs 1 foot below present level and get, with flood level 84 40 the same as before, a discharge at 3 feet of 1,066,000 cubic feet per minute at a cost of about Rupees 4,000 or 5,000.

Of these three methods I should certainly recommend the second were I sure that the calingulahs would not be damaged by the extra force of water which would naturally fall sheer on the lower steps of their aprons, and would render some, and probably an expensive, addition necessary in repair.

Rough stone is near and soil is rocky for apron — F J M

To my mind, therefore, the simplest plan would be to give up the upper foot of tank contents and content ourselves with a capacity of 94,539,640 cubic yards instead of 102,910,840 cubic yards, and I will now show why this is not so great a sacrifice as might be thought at first sight.

In the first place the tank actually fills only nine times in 21 years, so that we should rarely get a full supply for the whole of the lands, and the result of this is—and I fancy always will be—to discourage the ryots from taking up their additional lands as wet at all.

The greatest amount of actual cultivation under the tank at present is only 8,000 acres, and this is rarely attained. The full tank at a level of 81 40 instead of 82 40 will contain 94,539,640 cubic yards, which is sufficient (*vide* G O, No 705, of 9th March 1871, at 6,750 cubic yards per acre, exclusive, I imagine, of rainfall,) for 14,000 acres, which would give an increase of 6,000 acres on the present cultivation, and in addition to this there would be to a certain extent always a refilling of the tank in good years, so that we might water a larger area than 14,000 acres. I think, therefore, that this arrangement might be adopted for the present, and the stone removed stored for use in case it is thought fit hereafter to act on my second proposal.

*Proceedings of the Madras Government, Public Works Department,
2nd February 1875.*

Next year may be a dry one, but if so, we must not lose sight of the fact that without some alteration in the original design the tank will always be exposed to danger. At present the large opening, 280 feet long with 4 75 of water discharging over it, acts as a safety valve, and this cannot be closed until the calingulaks are a't red one way or the other.

No 195

MEMORANDUM

The undersigned has the honor to acknowledge the receipt of the letter, No 2,590, of the 17th ultimo, with its enclosure, from the Superintending Engineer, Chingleput, on the subject of the discharge from the Chembrumbaukum tank in 1872 and 1874, and of the arrangements considered necessary to render the tank safe in the future. In reply, it is requested that the following observations may receive consideration.

2 The discharge of October 1874 being apparently much greater than that of 1872, the former only need be considered. The maximum is reported by Captain A C Smith to have been 1,161,104 cubic feet a minute = cubic feet per second 19,352

of which the quantity which came into the tank by the new Bungaroo Channel from the Koratur Anicut was 3,577. The actual discharge from the tank is made up of that from the four masonry escape weirs and from an opening measuring 280 feet. The latter appears to have been calculated by Captain Smith as if there had been a clear overfall, and the result is, it is thought, a very excessive discharge. Without information as to the level of the water below this opening an exact calculation cannot be made, but it is probable that the discharge did not exceed 6,350 cubic feet a second against the 10,340 cubic feet supposed by Captain Smith. This officer has not numbered the paragraphs of his letter, a matter which should always be attended to, he alludes to the discharge by Ryves' formula with the co-efficient 562.5 as cubic feet per minute, whereas it should be cubic feet a second.

3 The undersigned cannot admit that it is necessary in the future to provide for the influx of great bodies of water from the Cooum, at any rate before that is done it must be demonstrated that effective means of preventing not only breaches, but spill from that river, are impracticable. All that should have to be provided for in the way of surplus at the Chembrumbaukum tank is the drainage in extreme cases from its catchment basin, which is estimated at 103 square miles.

4 It is said that the quantity of water entering the tank by the new Bungaroo was 3,577 cubic feet a second, but the depth of water has not been mentioned, and as the quantity to be carried by the channel with a depth of 6 1/2 feet is 2,963 cubic feet, it would seem likely that, with an extensive breach, and with the water going over the unfinished head sluice, the quantity must have been more considerable.

5 Taking, however, 3,576 cubic feet a second as the supply from the Cooum, and reducing the discharge at the opening No 5 in the tank bund to 7,000 cubic feet a second, it is thought that the following would be the maximum quantity of water requiring to be taken into account in determining the proper size of the surplus weirs. The co-efficient 628 will be used in preference to the apparently much higher co-efficient of two-thirds used by Captain Smith. Estimated discharge in October 1874 —

No 1 Weir	24 × 22 =	508	cubic feet a second.
Nos 2, 3, and 4 Weirs	600 × 13.28 =	7,968	
Opening			

= 7,000

Deduct Cooum water ...	15,176
... ..	3,576

feet of weir intended to be allowed at this tank would discharge this quantity with the

11,000 cubic feet a second and the 950

*Proceedings of the Madras Government, Public Works Department,
2nd February 1875.*

level of the water raised about 29 inches above full tank level. It is considered not only that this depth going over may be safely allowed, but that on the comparatively rare occasions on which even greater floods may be anticipated, a depth of 3 feet or even 3 1/2 feet on the weir crests would be admissible, and with the former the discharge would be 16,585 cubic feet, and with the latter 20,900 cubic feet, or nearly double the probable catchment basin discharge of October last. Captain Smith states that the revetment is, or will be, 4 feet above 82.40 the full tank level, and that the bund will be 4 feet above the revetment, so that even with 3 1/2 feet going over there would remain a margin of 4 1/2 feet. Moreover, Captain Smith supposes that the 1,000 feet of ground at the south end of the tank would be 1 foot above full tank level, the undersigned has not the papers to refer to, but supposing it to be 1 1/2 feet above full tank level with 3 feet going over the weirs, the discharge at this point would be (co-efficient say 50) about 1,000 × 5 = 5,000 cubic feet a second, an important aid on emergency. As, however, no discharge is referred to as having taken place at this point in October, it is supposed that at present no part of this 1,000 feet is as low as 83.90.

6 With regard to the application of Ryves' formula to the discharge of this basin, it may be remarked that taking its area at 110 square miles, the $\sqrt[3]{\frac{2}{m}} = 22.96$, and the discharge with 562.5 as the co-efficient would be 12,915 cubic feet a second, or somewhat more than that estimated above. This discharge also would be equivalent to 4.06 inches draining off the whole basin, and this would represent a much greater rainfall. Whether or no the actual rainfall would indicate a greater amount of drainage, in the absence of any information regarding the former, cannot be considered, but probably Colonel Moberly will be able to ascertain the rainfall of the period referred to at Saint Thomas' Mount and Poonamallee, and if there be any record kept at Tripasore or Trivellore and at Arconum or Conjeveram, a very fair average could no doubt be struck for the catchment basin of the tank. It will be necessary also to state whether any of the tanks in the basin breached.

7 As far then as the undersigned can judge, the 950 feet of surplus weir, with the aid from the supplemental escape on the high ground, will be capable of disposing without serious risk to the tank of about 7 inches draining off the whole area in the 24 hours, and he considers that these means of discharge should be completed as soon as possible, and certainly before the next north-east monsoon, and that the arrangements for giving full control over the Cooum water should be further inquired into, so that there may be no more breaching into the supply-channel, and no spill of importance elsewhere from beyond the margin of the catchment basin.

8 It may be remarked that the villagers must not in future be allowed to decide upon the necessity for affording increased means of outlet for flood waters, and that on occasions of extraordinary rainfall, a responsible member of the department should be present at this and all great reservoirs, and it should be determined beforehand where, and under what circumstances, such additional means of discharge are to be provided.

9 Colonel Moberly refers in paragraph 2 of his letter to the cutting of the north flood bank of the Koratur anicut by the Manapakum villagers "in sheer self-defence," but it has not been explained how this could be necessary that bank would have breached of itself had the water risen much above ground level, the crest of the anicut is much below that level, and 3.24 feet on the crest would give but a small depth on even lowlying lands, so without explanation it does not seem that the action of the villagers was excusable. In the case of the Kesaveram anicut and the old Bungaroo, it should be stated what was the level of the breached bank between the latter and the river, and to what height the water rose on either side, also if this bank was not topped, to what cause the failure is attributable. Such details are essential to a right understanding of the circumstances.

CAMP, AVANTY,
1st December 1874

To the Superintending Engineer, Chingleput

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

Proceedings of the Madras Government, Public Works Department,
2nd February 1875.

No. 44. ORDER THEREON, 2nd February 1875, No 234.

IRRIGATION, No. 1.

ORDERED that the foregoing papers,
which deal with a subject of great im-
portance, be recorded.

(True Extract.)

Colonel, R.E.,
Secretary to Government.

No. 995

Memorandum

The undersigned has the honor to -
No. 2890

Order No. 43 of the 5th Jan. 1875

The memorandum of instructions
to the Gen. Comptroller General
has been printed, the papers
being incomplete without it.

by 12/1/75

on 14/1/75

from the
fact, on the
Memorandum
of the
to render
reply it
inventions

8 1/4 being
of 1872,
The
acc. South
inmate =
19,352

as 35 1/2%
made up

of that from the masonry escape weirs, and
from an opening measuring 280 feet. The latter
appears to have been calculated by
Captain Smith as if there had been a
clear

Proceedings of the Madras Government, Public Works Department,
2nd February 1875.

No. 44.

ORDER THEREON, 2nd February 1875, No 284.

IRRIGATION, No. 1.

ORDERED that the foregoing papers,
which deal with a subject of great im-

N^o. 995

Memorandum.

7th The undersigned has the honor to -
acknowledge the receipt of the letter, N^o. 2890
of the 7th ultimo, with its enclosure, from the
Superintending Engineer, Chingleput, on the
subject of the discharge from the Chemburum-
-bankum tank in 1872 & 1874, and of the
arrangements considered necessary to render
the tank safe in the future - In reply it
is requested that the following observations
may receive consideration.

2 The discharge of October, 1874 being
apparently much greater than that of 1872,
the former only need be considered - The
maximum is reported by Captain ~~McC~~ Smith
to have been 116,104 cubic feet a minute =
cubic feet per second - - - - 19,352
of which the quantity which came
into the tank by the New Bungaroo
channel from the Korator Aricut was 3,577.
The actual discharge from ^{the} tank is made up
of that from the masonry escape weirs, and
from an opening measuring 280 feet. - The latter
appears to have been calculated by
Captain Smith as if there had been a
clear

clear outfall, and the result, it is thought, a very excessive discharge. Without information as to the level of the water below this opening an exact calculation cannot be made, but it is probable that the discharge did not exceed 6,350 cubic feet a second against the 11,340 cubic feet supposed by Captain Smith. This Officer has not numbered the paragraphs of his letter, a matter which should always be attended to; he alludes to the discharge by Dynes formula with the coefficient .62 as cubic feet per minute where as it shall be cubic feet a second.

The undersigned cannot admit that it is necessary to provide for the influx of great bodies of water from the Coomra, at any rate before that is done it must be demonstrated that effective means of preventing not only breaches, but spill from that river, are impracticable. All that should have to be provided for in the way of surplus at the Chemburambur tank is the drainage in extreme cases from its catchment basin which is estimated at 100 square miles.

It is said that the quantity of water entering the tank by the river Benagares was 2577 cubic feet a second, but the depth of water has not been mentioned.

mentioned, and as the quantity to be carried by the channel with a depth of $6\frac{1}{2}$ feet is 2963 cubic feet, it would seem likely that, with an extensive breach, and with the water going over the unfurnished head sluice, the quantity must have been more considerable.

5 Taking however 3576 cubic feet a second as the supply from the Coomra, and reducing the discharge at the opening No. 5 in the tank to 7000 cubic feet a second, it is thought that the following would be the maximum quantity of water requiring to be taken into account in determining the proper size of the surplus weirs. The coefficient .628 will be used in preference to the apparently much higher coefficient of $\frac{2}{3}$ used by Captain Smith. Estimated discharge in October 1874. No. 1 weir $24 \times 22 = 508$ cubic feet a second

No. 2, 3 & 4 weirs $600 \times 13 \times 28 = 7,968$
 Opening ----- $7,000$
 deduct Coomra water ----- $3,576$
 11,900 cubic feet a second and the 950 feet of weir intended to be allowed at this tank would discharge this quantity with the level of the water raised about 29 inches above full tank level. It is considered not only that this depth going over may be safely allowed, but that on the comparatively rare occasions

on which even greater floods may be anticipated a depth of 3 feet or even $3\frac{1}{2}$ feet on the weir crests would be admissible and with the former the discharge would be 11,585 cubic feet and with the latter 20,900 cubic feet or nearly double the probable catchment from discharge of October last. Captain Smith states that the rivestment is or will be 4 feet above 82.40 the F.T.L. - and that the bund will be 4 feet above the rivestment, so that even with $3\frac{1}{2}$ feet going over there would remain a margin of $4\frac{1}{2}$ feet. Moreover, Captain Smith supposes that the 1000 feet of ground at the south end of the tank would be 1 foot above full level bank; the undersigned has not the papers to refer to, but supposing it to be $1\frac{1}{2}$ feet above F.T.L. with 3 feet going over, the area the discharge at this point would be (coefficient say .50) about $1000 \times 5 = 5,000$ cubic feet a second, an important aid on emergency - As however no discharge is referred to as having taken place at this point in October, it is supposed that at present no part of this 1000 feet is as low as 83.90.

6. With regard to the application of Ryves' formula to the discharge of this basin, it may be remarked that taking its area at

at 110 square miles, the $Vm^2 = 2296$ and the discharge with 562.5 as the coefficient would be 12,915 cubic feet a second; or somewhat more than that estimated above - This discharge also would be equivalent to 4.06 inches draining off the whole basin, and this would represent a much greater rainfall. Whether or no the actual rainfall would indicate a greater amount of drainage, in the absence of any information regarding the former, cannot be considered, but probably Colonel McCoherly will be able to ascertain the rainfall of the period referred to at Saint Thomas's Mount and Poonamallee, and if there be any record kept at Trissore or Trivellore & at Arcorum or Cojimbaram, a very fair average could no doubt be struck for the catchment basin of the tank - It will be necessary also to state whether any of the tanks in the basin breached.

7. As far then as the undersigned can judge the 950 of surplus weir with the aid from the supplemental escape on the high ground will be capable of disposing without serious risk to the tank of about 7 inches draining off the whole area in the 24 hours, and he considers that these means of discharge should be completed as soon as possible and certainly

8. It may be remarked that the 3 layers
must not in future be allowed to decide
upon the necessity for affording increased
means of outlet for flood waters, and that on
occasions of extraordinary rain fall a responsible
member of the Department should be pre-
sent at the and all great reservoirs, in which
it should be determined upon how often,
and under what circumstances, such additional
means of discharge are to be provided.

action

(Signed) John Mullens ^{R. E.}
Chief Engr-for Irrigation

(Signature)

The Superintending Engineer
Chinghai
(True copy)

J. Mendenhall Colonel R.E.
Supt Engr Chingcheuk

12105 17 5 3
 Main Range Office
 4th November/95

From
 The Executive Engineer
 Main Range
 To
 The District Engineer
 Chingleput

Sir, With reference to the
 Chumbhakam tank I
 find I was mistaken in
 my calculations or rather
 in the data on which they
 were based in my letter
 No. 222 of 29th April last.

In the first place the
 average head or level of 82.88
 is incorrect, I arrived at
 this in this manner, the
 tank rose to 84.15 into I
 understood fell very rapidly
 so I thought it fair to
 take an average level which
 I did throughout the highest
 water register, and secondly
 I was not aware that water
 escaped through a cut made
 by villagers near the Rooshi
 waste their wheel enlarged
 to 186 feet in length, I find
 now on further examination

Enclosure in a
 letter from the Dy.
 Eng^{rs} Chingleput
 of the date 12/11/95
 Government of Madras
 dated 13th June 1907

11/9/12/95
 3

of this register here that after the cut had made the water again rose to 83.65 and this I think may be taken as the highest level the floods of 172 would have attained had the gap been made in the beginning of the rains.

With this head then we get the following discharge.

	Length	Level	Head
1 Panamunnee Weir	230	80.15	3.5
2 Phattan D.	114	80.65	
3 Roosli D.	280	80.65	
4 Opening enlarged to 186 to level 80.65			3.0

Capt Smith was a bit coughy but it does not affect the arrangement.

Number 1 gives a discharge of $230 \times 1400 = 322000$ Cfs per hour.
 2, 3 & 4 D. $580 \times 1110 = 643800$ do
 Total quantity of discharge in 1872 965800 do

I will now give the discharge which actually took place this year on the 25th October.

The tank water rose till it reached 84.90 and the state of the Calingulabs is as under.

	Length	Level	Head	Position
1 Panamunnee Weir	24	81.40	3.5	not built up yet
2 D. 206		82.40		
3 Phattan D. 114		82.40		
4 Roosli D. 280		82.40		
5 Opening enlarged to 280		80.15	1.9	

No. 1 gives a discharge of $24 \times 1401 = 33624$ Cfs per hour.
 No. 2, 3 & 4 $600 \times 845 = 507000$ do
 No. 5 $280 \times 2216 = 620480$ do
 11,61,104 do

previously proposed.

My proposed arrangement based upon the incorrect data given above will not nearly suffice, unless we are to leave out the consideration of the river breaching, but as it has done so in these floods it may do so again, and we ought therefore to provide for it; My arrangement to proposed 950 ft in length of Calingulabs with a head of 2 feet (which I am satisfied is as far as we can go with comfort to the tank) and this will only give a discharge of 5,78,000 Cfs per minute just about half the actual

discharge on 25th October last.

As far as I can ascertain the only quantity coming down the Bungari into the tank was 2,14,620 Cfs. per minute and this I think an outside quantity (this I approximated by taking the flood level section of the channel and its actual slope of bed) this came into the channel partly through the breach in the bank and partly over the New Head sluice.

Now deducting this amount from that shown as actually discharged over Calingulab we get 11,61,000 - 2,14,600 = 9,46,400 Cfs. per minute for the quantity supplied by local drainage.

I may as well here remark that this is about one fourth as much again as that obtained from the formula for rainfall.

$D = C \times \sqrt{M}^2$
 when $D =$ Cfs. per minute
 $C = 562.5$ according to locality
 and $M = 108$ sq. miles, the

new
 6×214620
 1287720
 1287720 Cfs. per minute
 1287720 Cfs. per minute
 1287720 Cfs. per minute

built only to spring
 line 27M

6×946400
 5678400
 5678400 Cfs. per minute

but $C = 562.5$ is the Cfs. per minute
 110² = 12100 - 2240 = 11880

outside measurements of the ground contained S and E of the Coom as far as the Chumbhulakam tank on the E. and down to a line on the South from Sauthe extremity of Coom tank to Streperator and so to Chumbhulakam tank.

up.
 In which area there are also many other tanks.

This worked out gives an amount of 7,65,000 Cfs. per minute which is about $\frac{1}{5}$ of the quantity actually discharged for 8 or 10 hours over the river. So return to the original subject. There is no doubt that the 11,61,000 Cfs. per minute is an abnormal discharge but on the other hand this might have been increased if the Chaudryhab had not breached and again if the river breached into the Bungari had been more extensive.

So all things considered I do not think we shall be over the mark if we allow for the free out

out fall of 1,000,000 Cft.
per minute as a certainty
with a river only 2 feet
above present Calugulak
level. Before going any
further I must state why
I consider 2 feet as the
proper level, or rather the
outside limit we can
allow in excess of full
tank level. During the
recent floods the top of
the front slope as already
reported (Vide my letter
No 2000 dated 2nd Instant)
was in places very much
cut up by the wash of
high waves above the re-
tirement; now the retire-
ment is only 4 feet higher
than Calugulak Crest, the
consequence was that with
2.5' on Calugulak the
waves washed right over
the retirement, and not only
destroyed the front slopes
above, but also the backing
behind the stones thereby
endangering

endangering the retirement
itself, and may here mention
that the cost of raising the
retirement 2 feet in height
will be about P^{ts} 2400 per
mile, including gravel
backing, and puddle, and
we should require about
3 miles of this work if any
It must also be remem-
bered that the top of the bank
is only 4 feet above that of
the retirement. This wash
therefore not only might
tend to destroy the bank
and endanger the limit
but it must always in
high floods cause great
expense. Therefore I fix
2 feet as the outside limit
for the tank to rise above
crest level.

The question then is
how to allow of a free
discharge of 1,000,000 Cft.
per minute, and keep the
tank down to 2 feet above the
present crest level or to allow
84.40 above mean sea level?

1st This single ho-
 dard by the extension of
 the Calingulals but an
 enormous extension will
 be necessary. Allowing
 for the Rooshi extension
 as already estimated which
 will make a total length
 of 950 feet with a 2 feet
 discharge of 5,78,000 cft.
 per minute and for the
 1000 feet flush escape
 already talked of at Sautto
 West extremity of tank B with
 a 1 foot discharge of 2,14,000
 we shall only secure a
 total about $\frac{4}{5}$ of the 10,00,000
 required and this work
 would cost about Rs. 9000
 or 10,000.

2nd We might extend
 the Rooshi as proposed
 making a total of 950 feet
 and cut down half of this
 length in gaps of about 8 ft.
 to be filled with self acting
 shutters to open directly the
 6 foot head was attained
 to

541500 mks = .628.

to a depth of 2 feet below
 crest levels by this means
 we would get a discharge
 of 11,00,000 cft. per minute
 at a cost of Rupees 7000 or
 8000.

3rd We might extend
 the Rooshi Calingulals as
 above, but, at a sacrifice
 of the contents of the tank,
 cut down the whole of
 the Calingulals one foot
 below present level and
 so, with flood level 81.40
 the same as before, a
 discharge at 3 feet of 10,60,000
 cft. per minute at a cost
 of about Rupees 4000 or 5000.

Of these three
 methods I should certainly
 recommend the 2nd which
 I am sure that the
 Calingulals would not
 be damaged by the extra
 force of water which would
 naturally fall sheer on the
 lower steps of the apron
 and would render some
 and

rough stone is near a rock
 is rocky for apron Jm

and probably an expensive addition necessary in rear-

To my mind therefore the simplest plan would be to give up the upper foot of tank contents and content ourselves with a capacity of 94,539,640 Cubic yards instead of 102,910,840 Cubic yards and I will now show why this is not so great a sacrifice as might be thought at first sight.

In the first place the tank actually fills only 9 times in 21 years so that we should rarely get a full supply for the whole of the lands and the result of this is, and I fancy always will be, to discourage the ryots from taking up their additional lands as much as at all.

The greatest amount of actual cultivation under the tank at present is only

8000

Would there not be a sacrifice of revenue for the sake of the tank?

...

...

8000 Acres and this is rarely attained. The full tank at a level of 81.40 instead of 82.40 will contain 94,539,640 Cubic yards which is sufficient (I take it) for 9 years of 1871 at 6,700 Cuyd per acre exclusive of irrigation of rain fall, for 14,000 Acres, which would give an increase of 6000 Acres on the present cultivation, and in addition to this there would be to a certain extent always a re-filling of the tank in good years, so that we might water a larger area than 14,000 Acres. I think therefore that this arrangement might be adopted for the present, and the stand removed should for use in case it is thought fit hereafter to act on my second proposal.

Next year may be a dry one but if so we must not lose sight of the fact that without some alterations

alteration in the original
design the tank will
always be exposed to danger.
At present the large opening
280' long with 4.75' of water
discharging over it acts as
a safety valve and this
cannot be closed until the
Galingulaks are altered one
way or the other.

*Again enlarged
slightly correct
dimensions will
be given when
water subsides.

I have "Yea"
Signed at 6 South Capt. R. E.
Executive Engineer.

7/1/2
7/2/6
7/1/2
7/2/6
7/1/2
7/2/6

H. Lindsay Coll. R. E.
District Engineer Chingleput

Ans -

2890

Chingleput Dist. Eng. Office
Gundry 17th November 1874.

From

The District Engineer
Chingleput

To

The Chief Engineer
for Irrigation.

I have the honor to enclose copy
of a letter from the Executive Engineer
Mount Range regarding the discharge
during the late rain from the weirs of
Chenimankam tank supplemented
by the breach beyond the Pooshai,
which was left weak fortunately from
1872, and was so much scoured that
its average height was 2.25 below the
crest of the weirs generally.

Submitted
to the
Board
for
consideration
on 11/1/74

The water rose to 3.24 ft above
the crest of the Koratur dam as reported
in my Lt 2606 of 27th October 1874. The
banks north of the North wing wall is said
to have been cut, in sheer self defence, by
the inhabitants of Manapakam. I
think it would be well to reopen the 3
sand sluices about 100 ft long in the wall,
and to fit them with shutters, we must
also

also either lengthen the weir, or build a head sluice at Kasaveram. There is spite of the lengthening of the weir by 60 ft. so much water came into the head of the channel that it has breached 212 yds of the dividing bank - 72 yds near the head wall, which has been much shaken, & 140 with the East wing of the surplus weir, a considerable breach too was made near Perembakur but the water which passed out of it returned to the Coovun a mile or so lower down.

I have desired levels and cross
sections to be taken and hope shortly to
be in a position to report more definitely
on the subject.

I have the honor to be
Sir
Your Most Obedt Servt
H. M. C. C.
Dist. Eng. Chngt

1. The Secretary to Govt. V.M.C.

also either lengthen the weir, or build a head sluice at Kasaveram. There in spite of the lengthening of the weir by 60 ft. so much water came into the head of the channel that it has been much winged of the breach too, but the weir returned to

sections to be in a position to sub-

To Supy of the
1995 1 Dec 74

C. S. No. 2114

50000 m. in the Res

From probers

The Dist. Engr
Chingput

The Chief Engr
for irrigation.

Dated 17th
Recd 18th Nov 74.

1/12/74 No 2890
Enc 1.

Encloses copy of a letter from the Engr Mount Range with his own observations on the discharge during late rains from the weirs of the Chembumbakam Tank.

M. 7712/74.
G.O. No 284-2-2-75

N. 999C. 37
Memorandum

A letter No 2890 of the 18th November from the Superintending Engineer, Chingput, with its enclosure, and a memorandum of instructions sent to that office in reply, are submitted for the information of Government. These papers refer to the recent floods in the basin of the Chembumbakam Tank, and to the damage sustained at the Korater ariant on the Coorn, which supplies it, as also at the Kasavaram ariant on the Cortiliar which, through the old Bungairoo, supplies the Coorn.

Camp at Chinnapenputty 3
2nd December 1874 3
Chief Engineer for Irrigation
P. The Secretary to Govt P.W.D.

Proceedings of the Madison Government
 Read the following -
 From The Chief Engineer } C.R. No 999C d/2 Dec/74
 for Irrigation } ~~28th~~

Ordered that the
 foregoing papers, which
 deal with a subject of
 great importance, be
 recorded.

Wm. 3/12/74

[Signature]

To The Chief Engineer for I.R.
 S. E. Chinglet
 d/1/2 to C.R. 1/2/75.

P. M. 1894
 No 999C No: 712

From The Chief Engineer for
 Irrigation
 to The Secretary to
 Government
 P.M.

Order of Deciding
 Dec 11 do - 1894

13 Enclaves

Submits for information
 papers from the Deputy
 Chief Engineer reporting the
 damage from the rising
 the Clearwater River
 and the damage sustained
 by the Pecos River
 during the last
 heavy rains.

Dec 12-12-74

1891-12-74

The Casuarina & Horatio
Ancients and the damage sustained
by the Casuarina & Horatio
Ancients during the late
heavy rains.

7712 ✓

Govt. of Madras
PUBLIC WORKS.

To The Chief Engineer
Dated: 11/1/91
Recd: 11/1/91
Ind: 3
G.O. No. 5284

Res. 4-44

Casuarina & Horatio
Ancients - Shingle plot

Papers submitted by
the Chief Engr. for review
on the subject ~~the~~ ^{the} ~~ancients~~
of the damage
done to the Casuarina &
Horatio Ancients by the
late heavy rains, re
order of