

(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.

239

B.P. No.

Press

Mis.

Original

Dated

27. 1.

195

1875

Not to be folded or roughly handled

*Proceedings of the Madras Government, Public Works Department,
27th January 1875.*

No. 491. Read the following endorsement of the Chief Engineer for Irrigation, dated Carryputty, 11th December 1874, No. 1,029 :—

From Captain J. PENNYCUICK, R.E., District Engineer, North Arcot, to Colonel G. W. WALKER, R.E., Secretary to Government, Public Works Department, dated Vellore, 29th October 1874, No. 2,088.

I REGRET to have to report the occurrence of serious damage to various works in this district from the floods of the last few days.

2. I had proceeded to Madras on the 23rd instant on the leave granted me in the "Gazette" of the 25th August 1874; but, on hearing that injury was being done by floods, returned by the first opportunity and resumed charge of the district.

3. The bridge over the Palar between Vellore and the Railway Station gave way on the morning of the 27th; sixteen arches have already fallen, and at least two more will have to be removed if they do not fall of their own accord.

4. All communication between the town and the railway was impossible during the 27th, but yesterday it was found practicable, though difficult, to cross by means of rafts, and I and others got over in this way.

5. Although the water has fallen considerably, the rush through the bridge is still too great to enable it to be approached with safety, and no examination of the fallen arches can be made for the present. A detailed report of the nature, extent, and (if ascertainable) cause of injury will be submitted as soon as possible. I fear, however, that more arches will go if the river rises again, as the fallen masonry has regularly dammed up the bed towards the left bank, and there is now a very strong set of the current in the direction of the right bank. The bridge consists of 42 arches of 43 feet span.

6. The Palar Anicut has breached at the middle of the stream, and about 200 yards are said to have been carried away. The water rose to $14\frac{1}{4}$ feet on the sill of the head sluices, being 9 inches higher than the maximum during May 1872, and would doubtless have been higher still if the anicut had not given way.

7. The Caveripak Channel from the Palar Anicut has breached, and the water from it falling into the Govindavady Channel has carried away the greater part of the work done towards the restoration of the St. Andrew's Bridge which fell last October.

8. The Poiney Anicut is reported has "seriously injured," but no further details have been received.

9. From Arnee I have received no intelligence as yet, but I greatly fear that the Cheyaur Anicut has suffered. The water was 15 feet above the sill of the sluices on the 26th; and, as this is 3 feet above the maximum previously recorded, it is almost impossible that the head works should have escaped serious injury.

10. I have as yet heard of the breaching of but three tanks, of which only one—the Poondy Tank—is of importance, but news of others is certain to follow.

11. For the present my intelligence is almost entirely by telegraph, no letters having been received for four days. It is not clear why this should be so, as communication with the Railway was perfectly practicable yesterday morning, and there is no conceivable reason why the mails should not have been brought over by noon.

12. Such further report, as may be necessary, will be made hereafter. It is obvious that these disasters following so close upon those of the early part of the

year will put a very severe strain upon the department, but Government may rely upon every effort being made by the Public Works Officers for the mitigation and repair of damages.

13. A copy of this report has been forwarded to the Chief Engineer for Irrigation.

No. 2,101.

P.S.—Since the above was written a few letters have been received, but the only information of importance is contained in a demi-official from the Collector who informs me of the destruction on the 26th instant of the bridge on the Bangalore road over the Palmanair River, 3 miles from the town of that name.

(True Copy.)

VELLORE,
29th October 1874.

(Signed) J. PENNYCUICK, Captain, R.E.,
District Engineer, North Arcot.

From Captain J. PENNYCUICK, R.E., District Engineer, North Arcot, to Lieutenant-Colonel J. MULLINS, R.E., Chief Engineer for Irrigation, dated Vellore, 23rd November 1874, No. 2,380.

In continuation of my letter, No. 2,101, of 29th ultimo, I have the honor to report that I have inspected the Palar and Poiney Anicuts; but that, at the time of my inspection, there was still too much water in the rivers to admit of any thing like a proper examination of the foundations.

2. At the Palar upwards of 1,500 feet, out of the original length of 2,600 feet, have been destroyed; as far as could be ascertained by soundings with an iron rod, the foundations have been completely torn up to a depth of at least 3 feet below the sill of the head sluices.

3. It is stated that the anicut gave way first at the central under-sluice, and this is probably the case. In the middle of the stream there is no trace of the body wall to be found at present; but for a considerable distance at each side of the breach the wall is lying up-stream, showing clearly that a breach was first formed in the middle, and that the scour produced by the set of the current towards this breach undermined the foundation on the upper side, and thus caused the body wall to fall in.

4. The effect of this scour is very noticeable at the bridge piers which, as you are aware, are built in with the body of the anicut. A hole, 7 or 8 feet deep, is scoured out on the side of each pier furthest from the breach, the sand on the side nearest to the breach being flush with the top of the pier and anicut wall. But the most remarkable proof of the force with which the stream set towards the breach is in the fact of one pier (the 17th from the left bank) having been completely torn off from the anicut wall and carried away, the anicut itself being uninjured at this point, and for about 10 yards beyond it.

5. It is not at all improbable that the breach was directly caused by the existence of vents in the middle of the anicut. A tree coming down the stream might easily be drawn down by the draught through the vents and so be forced against the covering stones and displace them, at the same time loosening the masonry in the neighbourhood. Even if this did not happen, the lateral scour produced by the draught through the sluices must necessarily be injurious to foundations. At the best these vents are a source of constant trouble and expense, and I have never been able to understand their object, as they do not serve the purpose fulfilled by vents near the flanks of an anicut of keeping the head sluices free from silt.

6. With the exception of the anicut the head works have suffered no injury, but, as already reported, the overflow of the Palar breached the Poondy Tank, and the water from the latter breached the Caveripak and Govindavady Channels, and threw an excessive quantity into the Caveripak Tank.

7. Various wild statements, to which I do not attach much credit, have been made as to the level to which the water rose in the latter tank, but there appears to be no doubt that the surplus channel was full nearly, if not quite, up to the crown of the arches of the bridge immediately below the tank calingulabs, so that the discharge must have been very great. The tank sustained no injury, and I think we may congratulate ourselves on the result of the work done to it during the last two years.

8. In my letter, No. 2,101, of 29th ultimo, I stated that the flood water entering the Govindavady Channel had carried away the work done for the restoration of the bridge on the trunk road, but I find that the damage done was very slight, being confined to the destruction of a small quantity of half-finished archwork, the piers being uninjured. As the channel was blocked up with centering pillars, etc., this speaks well for the way in which the work has been done.

9. The Poiney Anicut has been completely carried away from end to end, nothing being left but the under-sluices on each flank, and, as far as can be judged at present, the destruction of the foundations is as complete as at the Palar. No material injury has been done to the head sluices or the anicut channels.

10. I have given orders for the immediate collection of materials for the repair of the two anicuts and for the construction of bunds across the breaches as soon as the condition of the river allows. Every effort will be made to get the restoration so far advanced during the next six months as to enable the June freshes to pass into the channels. I take it for granted that no question regarding funds will be allowed to interfere with the vigorous prosecution of these repairs.

11. I cannot find in this office, or in either of the Range Offices, any plans or sections of either anicut; if any such are in your or the Government Office, I shall feel much obliged by their being sent to me.

12. The Cheyaur head works have escaped material injury, the road embankment having given way and so relieved the anicut and bridge, but the channel, as usual, has been damaged in several places. This channel has only one bank, and acts as a catchment drain to all the country above it, and will never be in a satisfactory condition until it is properly embanked, and arrangements made for passing surface drainage across, instead of into, it.

13. The Poorsay Tank, the terminal tank of the Cheyaur Main Channel, and one of the largest in the Wandewash Taluq, had a very narrow escape. The bund was topped almost from end to end, and was only saved by the fact of the Wandewash-Trivatore Road passing along it, and its being therefore of greater width than ordinary, and metalled on the top. If this tank has gone, it is hardly possible that the Madurantakum Tank could have escaped. I am not at present satisfied as to the true cause of this excessive influx of water to the Poorsay Tank, nor therefore as to the proper measures to be taken for its future safety, but the matter will receive full consideration.

14. Of breached tanks, the following are reported:—

Wandewash	...	...	...	...	...	...	36
Poloor	...	...	...	...	...	...	20
Wallajah	...	...	...	...	...	...	14
Palmanair	...	...	...	...	...	...	3
Chittoor	...	...	...	...	...	...	3

but, with the exception of the Poondy Tank, none of them are of importance.

15. The floods of this year have exposed the imminent danger to which the irrigation works and the country generally along the banks of the Palar and Cheyaur are exposed from the overflow of these rivers. Last year was an unusually dry one, and the evil did not show itself, but this year the damage done has been very great.

16. The road from Wallajahpett to the Palar Anicut has been twice breached by the overflow of the river above the anicut, and on the second occasion the damage described in paragraphs 6 and 8 of this letter, the repair of which will cost not less than Rupees 8,000, was caused. Three times the river has overflowed its right bank above Vellore and breached the road to the Railway Station, causing heavy expense to the Municipality and immense inconvenience to the towns.

people. Near Pallicondah aggh, about 7 miles higher up, it has overflowed and damaged the road. The Cheyann has got and over again injured the roads, running along its banks, and estimates, aggregating upwards of Rupees 10,000, have been found necessary for the repair of injuries caused by this one river. Apart from the injuries to public works, the damage done to crops by the fields being flooded is very serious, and many complaints are made by the ryots on this account.

17. The left bank of the Palar above the anicut will be dealt with at once in the interests of the anicut works, and estimates for the purpose have already been prepared. With regard to the other points where improvements are necessary, it will be a question how far the charges to be incurred should be considered Imperial and how far Local; this, however, is a matter of detail, the essential point being that the subject should be taken up systematically and completely. It is obvious that any work of this nature must include the construction of head sluices to the numerous open river channels which in their present condition would simply be so many breaches in the embankment.

SUBMITTED for the information of Government.

With a view of obtaining the best information possible as to the cause of the breaching of the Palar and Poiney Anicuts, these works were visited on the 8th and 9th instants.

2. *Palar Anicut.*—The Palar Anicut consists of a body wall 6 feet above the first apron, which is of large split stone 10 feet wide; the second apron is of rubble masonry 36 feet wide, and beyond this there was an outer rough stone apron 15 feet wide.

The excellence of the masonry of this weir I had on previous inspections noticed, and the present state of this work abundantly testifies to the careful way in which it was built. Every part of the masonry, which has been left standing, is in good order; the body wall and the bridge piers held out until they had been undermined to such an extent as to cause lengths of many feet to break off in a mass, and those masses were not buried in the sand remain without the displacement of hardly a brick, and most of the coping is as firmly fixed as ever on the top of the over-turned masses of wall. The bridge piers are about a foot higher than the anicut crest, and are of brick-work unplastered, and I did not see one brick of their top courses missing, except on the lower edge of one of the cut-waters, and this I rather think was washed out long ago. The bridge, it should be mentioned, never was completed, but stands as a monument, like that across the same river near Chingleput, either of want of sufficient consideration, in the first instance, of the needs of the country, or of the absence of that fixedness of purpose without which no good results can be attained. The bridge near Chingleput would have been a work of great utility, and, when all the difficult part of it had been done, it came to a standstill, the less complete but still convenient causeway having been destroyed to make way for the bridge. The Palar Anicut Bridge would never have been worth its cost, its site being 5 or 6 miles below the point, between Arcot on the one bank and Raneepett on the other, where a bridge would have been of great value.

3. *Anicut Bridge.*—As it is certain now that a bridge across the river at the anicut will not again be proposed, seeing that so much of the work before done

has been washed away, it will be advisable to cut down the remaining piers to 2 feet below the crest of the weir, leaving the lower parts to act as small groynes.

4. *Causes of damage.*—It is possible that, as Captain Rennywattick has suggested in paragraph 6 of his letter, the damage to the anicut may have commenced at the under-sluices which occupied a position at its centre. The more detailed examination however, of which the state of the river at the time of my visit admitted, indicates, in my opinion, very clearly that scour below the outer apron working back and engulfing that, then undermining the rubble masonry apron and that of split stone, and so having the main wall open to attack, was the direct cause of the breach. The aprons have received no injury whatever from the overfall; indeed, from the weir wall to the outer edge of the rubble masonry apron there has been no damage of any kind, except the removal of a few square feet of the outer edge of the extended apron at the south side of the southern set of under-sluices; and this was manifestly caused by undermining. The outer rough stone apron has, with few exceptions, disappeared from sight, and in many places a 10-foot pricking rod met with no resistance, but elsewhere stone was found 4 or 5 feet below the surface, and in some places a good deal of stone has merely sunk. The direct evidence of the breaching of the dam having been caused by scour below, it is confined to the visible action of this kind at the southern set of under-sluices above referred to, and to the position of one large mass of the rubble stone apron just to the south of the place which was occupied by the centre set of under-sluices; this mass has the edge which was nearest the weir wall tilted up about 6 feet, and the original surface of the apron is down stream, so that it certainly was undermined and torn off; the lower part falling into a hole of very considerable depth.

5. The position of the breach may have been determined by the action of the water passing through the central under-sluices, coupled with the location of sand banks below the dam; and of this latter there is no record. The different degree of displacement of the rough stone apron below the parts of the anicut still standing shows that the intensity of the action varied considerably, and the scour went on most rapidly where from some local causes, in which may be included a rather marked set off the left bank of the river above the anicut, this action was the most marked. Nothing is known at present as to the dimensions of the breach at first, but probably nine-tenths of the damage were caused after the breach by the undermining on the up-stream side caused by the water rushing towards the breach. The bridge piers, no doubt, greatly retarded the destruction, for they had to be destroyed before the foundations of the weir wall were open to attack.

6. The foregoing details have been dwelt upon at some length, because, in order to provide against future accidents, it is necessary to understand as clearly as possible why this fine anicut has failed. It was built some 20 years ago, and has never before, so far as I am able to ascertain at the moment, suffered any serious injury of any kind, repairs having been confined to pointing the aprons and replacing the sunken or washed-away stone of the outer apron. The level of this destructive flood was from $7\frac{1}{2}$ to $7\frac{3}{4}$ feet above the crest of the anicut, a height from which no apprehensions of damage to it need have been felt.

7. *Old section a good one.*—I am able to suggest no improvement of the old section up to the outer edge of the rubble masonry apron. The central under-

sluices were not of much, any, use, and they should be omitted from the restoration; but those under-slucies which remain uninjured should be repaired permanently. The sets nearest the head sluices should continue to be made use of to keep the channel heads clear, while the others should, as a rule, be kept closed. All the revolving shutters should be removed from the under-slucie vents, and needle shutters should be substituted, the latter being supported at top by a cross stone, with a second stone in front, and below by two 3-inch round bars of iron. It may occasionally be necessary or desirable to lower the water level in the basin above the anicut, and for this purpose the efficient under-slucies should be retained, though at a distance from the channel heads.

8. *Means of rendering anicut safe in future.*—Security against damage in the future will best be obtained by a material addition to the outer rough stone apron and by keeping a reserve of stone on the spot for replacing sunken or removed stone. The District Engineer has been requested to provide in his repair estimate for an outer apron of 30 feet width, or double that of the former one, and this is to have a depth of 4 feet at the junction with the masonry apron and of 3 feet at the outer edge, and its surface is to be placed 1 foot below that of the masonry apron. The reserve of stone should be one-third of the contents of the outer apron, or, say, 3,500 cubic yards, and, for the reasons given in connection with similar reserves in Tanjore, their value should be charged to stock.

As an additional security, groynes 45 feet long and at 90 feet from centre to centre should be run out from the outer edge of this apron and at right angles to it; they may have a width of 1 yard at top and 3 yards at the base which will be flush with the under side of the outer apron; they will prevent the formation of channels running parallel to the apron within a distance which would be of moment. The surface stones of the outer apron should be large; 2 cubic feet or 300 lbs. weight will be a proper size.

Above the anicut groynes 60 feet long should be placed on the river side of the under-slucies next the head sluices or wings, on both sides of the other under-slucies, and at about 180 feet intervals between the latter. At their junction with the remaining piers or body wall they should be 2 feet below the crest of the anicut, and at the outer end flush with the under-slucie sills. They will check the lateral currents above the anicut. In other respects the details of the section of the uninjured part of the anicut should be adhered to.

9. *Checkramelloro Channel Head.*—Some erosion of the right bank of the river below the weir took place, and the Checkramelloro Channel, which has its head in a raised part of the anicut at the southern end, was breached. There has been a proposal to do away with this head, and to supply the channel from the Doosy Channel: the feasibility of so doing should be ascertained at once, and, if it be not practicable, the head sluice of the channel must be raised to 3 feet above the flood of 1874, or 10 feet above crest of anicut, and the wall, which forms the left bank at the head, must be raised in proportion, and the bank in continuation of this wall must, for a distance of 100 yards, be strongly revetted on the river side, care being taken, first, that a yard in thickness of good soil, revetted with nanul, is placed immediately behind the revetment; and, secondly, that the latter is founded 5 feet below under-slucie sill, and protected by 9 feet width of rough stone apron, 3 feet thick placed with its surface 2 or 3 feet below the sill level.

10. *Head Sluices.*—The walls under the arches of the South Main Channel head sluice have been raised since my visit to the works in May 1873 to 6 inches above the recent flood level, so that no water entered this channel, except through the vents which are regulated by revolving shutters which are very difficult to work. No damage was done.

The similar walls of the northern head sluices should be similarly raised, as they were submerged by the flood water, and thereby an addition was made to the quantity of water which found its way into the channels by spill from the river.

The southern flood bank above the anicut stood well, and suffered only slight erosion of the front slope. Its alignment is not good.

11. *Overflow of the Palar generally will have to be controlled.*—It will be necessary to ascertain at what points throughout the district the Palar overflowed its banks, or breached its embankments, as also the course taken by the water so spilt, for flood banks, which are liable to be turned, are of very little value. Continuous levels of the river bed, with cross sections at intervals and flood levels as often as these can be found out, will be requisite to deal properly with this subject wherever the ground on either side of the river is not palpably well above the necessary level, and it must be borne in mind that some of the affluents will also need embanking for a greater or less distance from the point of junction.

12. *Poinery Anicut.*—The state of the Poinery Anicut is somewhat better than the District Engineer supposed to be the case when his letter was written, as 256 feet remain out of 792 feet. Here, as at the Palar, there can be no doubt of scour in rear having been the cause of the damage, though why this particular fresh should have caused a breach it is difficult to conjecture. The anicut was seen by the Range Officer, Mr. Smithers, just before the fresh, and the aprons were then in good order. The Monigar says that the apron failed first, and the breaching of the weir wall followed.

The aprons were as follow, and certainly those of masonry were very ample:—

First apron 12 feet wide of split stone with a drop of 1 foot at its outer edge.

Second apron 27 feet rubble stone-in-chunam 3 feet thick, with a retaining wall 3 feet deep under outer end and 6 feet wells below that.

Third apron rough stone 12 feet wide, except at the under-slucies where 10 feet additional width was given and 3 feet thick.

The fresh was about 1 foot lower than those of October 1871 and May 1872, and there was no unusual volume of water, therefore, to account for the accident. The river bed has been changed so entirely by the sweeping away of so much of the anicut as to afford now no evidence of its circumstances before the accident. The weir was inspected by me in May 1873, and in a memorandum of instructions

No. 292, of the 12th May.

sent to the District Engineer, it is noted that but little damage had been sustained from the freshes of the preceding year, and that only ordinary repairs were required. It was remarked that the crest of the anicut was rather weak compared with what is usual (it is rubble stone—)

in-churam instead of large well-shaped stone), but that it appeared to have stood well, and would probably continue to do so if good lime were used for the joints. A great deal of the body wall fell down stream, which indicates that much of the apron failed about the same time. Some of this wall sank almost vertically, where it stood, and the coping is now but little above bed level.

This anicut was built at about the same time as that on the Palar, viz., about 20 years ago, but its masonry, whether brickwork or stone, is inferior to that of the latter, and it is questionable whether the lime is so good. I saw, however, no reason for supposing that this had any thing to do with the failure, and of course 20 years are a sufficient trial to render it very improbable that faults of construction should have been the cause of the accident.

The disappearance of the outer rough stone apron behind the remaining parts of the anicut show that this was really the weak point, and it may be noticed that this disappearance would seem to have taken place before the breach occurred, the current was concentrated in the middle of the bed.

The remedy will be, as at the Palar, a large addition to the width of this apron which should be made 24 feet wide instead of 12 feet, 4 feet thick at the junction with the rubble masonry apron 3 feet at the outer edge, and the surface should be 18 inches below that of the second apron. Also, at the suggestion of the District Engineer, a retaining wall midway between the body wall and the retaining wall of the second apron will be inserted. Groynes should be run out from the edge of the rough stone apron down stream and above the body wall up-stream, as noticed in detail for the Palar Anicut.

The new body wall should be made somewhat more massive than before, the width of the crest being increased by 1 foot and rounded off at the junction with the old walls. The crest should be of split stone (whole stones) not less than 9 inches thick.

A reserve of stone to the extent of one-half the contents of the outer apron should be maintained.

13. Certain improvements to the head sluices and under-sluices and other precautions detailed in the memorandum above referred to have not as yet been carried out, and they should be attended to at an early date. Had the fresh of this year been a foot higher than that of May 1872, there might have been a good deal of preventible damage done.

14. *Cheyaur Anicut.*—Government have already had before them the information given in the District Engineer's letter, No. 2,088, of the 29th October last. It will, however, be noticed with satisfaction that the head works of the Cheyaur Anicut have not suffered materially, but the facts of this flood must be acted upon at once, and a sufficient margin provided against future contingencies. Each drainage falling into the Cheyaur Anicut Channel should be dealt with according to the circumstances. It is but seldom financially advisable to pass extreme floods entirely under a canal, but about one-third of such floods may, with advantage, be provided for by aqueducts or culverts, and for the remainder fully adequate inlets and outlets are the best arrangement consistent with economy.

Ten feet a second is a safe velocity of discharge through culverts, and the length of the inlets and outlets should be determined with reference to the maximum level to which water in the canal may be allowed to rise.

15. The construction of head sluices to the several open river channels of the several rivers is, as the District Engineer remarks, a necessity if flood waters are to be confined within embankments and prevented from going all over the country damaging cultivated lands and breaching tanks.

16. *Temporary bunds above the anicuts.*—There is nothing now to prevent a bund being thrown across above the breach in the Palar Anicut, and a similar bund will be placed above the Poiney Anicut. The District Engineer is of opinion that all the irrigation has hitherto been fully supplied, and the quantity of water in these rivers being now small, the bunds will be comparatively easy works to construct, and no time should be lost in collecting the large quantities of stakes, brushwood, and nanul or other grass, which will be required before operations can be commenced.

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

No. 492.

ORDER THEREON, 27th January 1875, No. 239.

IRRIGATION, No. 52.

THE foregoing papers contain information regarding the damage sustained by the Palar and Poiney Anicuts and certain works of irrigation and other works in the North Arcot District in October last, together with the remarks of the Chief Engineer for Irrigation on the probable causes of the serious injury which the anicuts have sustained. The District Engineer will be guided by these remarks in preparing his estimates, and, in the meantime, materials must be got ready with the utmost possible despatch, so that the foundations may be completed during the most favorable season of the year.

2. The work is one of reconstruction rather than of repair, and the Government of India have already been requested to make an additional allotment of Rupees 50,000 to meet its cost, and that of similar emergent works, which must be carried out in anticipation.

(True Extract.)

(Signed) G. W. WALKER, Colonel, R.E.,
Secretary to Government.

To the Chief Engineer for Irrigation.

„ District Engineer, North Arcot.

„ Controller of Public Works Accounts.

Per: Depatt.

Exd. A. Grubert.
Spare Copies

N^o 2088

North Arcot
District Engineer's Office

Vellore 29 October 1874.

From

Captain J. Pennington R.E.
District Engineer
North Arcot.

To

Colonel G. W. Walker R.E.
Secretary to Government
Public Works Department
Madras.

Sir

I regret to have to report the occurrence of serious damages to various works in this District from the floods of the last few days.

2. I had proceeded to Madras on the 23rd instant on the leave granted me in the "Gazette" of the 25th August 1874, but on hearing that injury was being done by floods, returned by the first opportunity and resumed charge of the District.

3. The bridge over the Palar between Vellore and the railway station gave way

way on the morning of the 27th. sixteen arches have already fallen, and at least two more will have to be removed if they do not fall of their own accord.

4. All communication between the town and the railway was impossible during the 27th, but yesterday it was found practicable, though difficult, to pass by means of rafts, and I and others got over in this way.

5. Although the water has fallen considerably the rush through the bridge is still too great to enable it to be approached with safety. And no examination of the fallen piers can be made for the present. A detailed report of the nature, extent, and (if ascertainable) cause of injury will be submitted as soon as possible. I fear however that more arches will go if the river rises again, as the fallen masonry has regularly dammed up the bed towards the left bank, and there is now a very strong set of the current in the direction of the right bank. The bridge consists of

42 Arches of 43 feet span.
6. The Palar Anicut has breached at the middle of the stream and about two hundred yards are said to have been carried away. The water rose to 14 $\frac{1}{4}$ feet on the sill of the head sluices being nine inches higher than the maximum during May 1872, and would doubtless have been higher still if the Anicut had not given way.

7. The Saveripati Channel, from the Palar Anicut, has breached, and the water from it falling into the Govindavadi Channel has carried away the greater part of the work done towards the restoration of the St. Andrews bridge which fell last October.

8. The Pomey Anicut is reported as "seriously injured" but no further details have been received.

9. From Arni I have received no intelligence as yet, but I greatly fear that the Cheyar Anicut has suffered; the water was fifteen feet above the sill of

of the sluices on the 26" and as this is three feet above the maximum previously recorded, it is almost impossible that the head works should have escaped serious injury.

10. I have, as yet heard of the breaching of but three tanks, of which only one, the Poondy tank, is of importance but news of others is certain to follow.

11. For the present my intelligence is almost entirely by telegraph, no letters having been received for four days. It is not clear why this should be so, as communication with the Railway was perfectly practicable yesterday morning and there is no conceivable reason why the mails should not have been brought over by noon.

12. Such further reports as may be necessary will be made hereafter; it is obvious that these disasters following so close upon those of the early part of the year will put a very severe

severe strain upon the department, but Government may rely upon every effort being made by the Public Works Officers for the mitigation and repair of damage.

13. A copy of this report has been forwarded to the Chief Engineer for Irrigation.

I have the honor to be
Signed J. Pennycook, Capt. &c.
District Engineer, North Arcot.

P.S. Since the above was written a few letters have been received, but the only information of importance is contained in a demi official from the collector, who informs me of the destruction on the 26" inst. of the bridge on the Bangalore road over the Palamair river, three miles from the town of that name.

North Arcot
Dist. Eng. Office
Vellore 29 Oct 1874

No 2101

(True copy)

John Pennycook Capt. &c.
District Engineer, North Arcot.

To The Chief Engineer
For Irrigation
Madras

Handwritten text in a cursive script, likely a letter or a page from a manuscript. The text is written on aged, slightly torn paper. The script is dense and fills most of the page. The text is written in a cursive script, likely a letter or a page from a manuscript. The text is written on aged, slightly torn paper. The script is dense and fills most of the page.

Handwritten text in a cursive script, likely a letter or a page from a manuscript. The text is written on aged, slightly torn paper. The script is dense and fills most of the page. The text is written in a cursive script, likely a letter or a page from a manuscript. The text is written on aged, slightly torn paper. The script is dense and fills most of the page.

No. 2380... North Creek
 District Engineer's Office
 Yellow 23 November 1874.
 From the...
 The District Engineer
 North Creek
 To...
 The Chief Engineer
 for Irrigation...
 Sir

In continuation of my letter
 No. 2101 of 29th Sept. I have the honor to
 report that I have inspected the
 Palar and Poring canals, but
 that at the time of my inspection
 there was still too much water in
 the rivers to admit of anything
 like a proper examination of the
 foundations. At the Palar upwards of
 1500 feet out of the original
 length of 2600 feet have been
 destroyed, as far as could be
 ascertained

Form. No. 2040
 The District Engineer
 North Creek
 To
 The Chief Engineer
 for Irrigation
 Madras
 District
 Road 2nd Nov-74
 No. 2101
 Enclosure.
 Forwards copy of letter
 sent to Government
 reporting the occurrence
 of serious damage to
 various works in the
 District from the
 of the lower part of
 Mr. 2856/74
 2/74

Ascertained by soundings with an iron rod the foundations have been completely torn up to a depth of at least three feet below the sill of the head sluices.

3. It is stated that the ancient gate way first at the Central under sluice, and this is probably the case. In the middle of the stream there is no trace of the head wall to be found at present, but for a considerable distance at each side of the breach the wall is lying up stream, showing clearly that a breach was first formed in the middle, and that the scour produced by the set of the current towards this breach undermined the foundations on the upper side, and thus caused the head wall to fall in.

The effect of this scour is very noticeable at the bridge piers, which as you are aware are built in with the body of the ancient

ancient. A hole seven or eight feet deep is scoured out on the side of each pier furthest from the breach, the sand on the side nearest to the breach being flush with the top of the pier and ancient wall. But the most remarkable proof of the force with which the stream set towards the breach is in the fact of one pier (the 14 from the left bank) having been completely torn off from the ancient wall and carried away, the ancient wall itself being injured at this point, and for about ten yards beyond it.

5. It is not at all improbable that the breach was directly caused by the existence of vents in the middle of the pier, a tree coming down the stream might easily be drawn down by the drought through the vents and so be forced against the covering stones, and displace them, at the same time loosening the masonry in the neighbourhood. Were it that did not happen the lateral

scour

Above produced by the draught
 through the sluices must necessarily
 be injurious to foundations. At
 the best, these vents are a source of
 constant trouble and expense. And
 I have never been able to under-
 stand their object, as they do not
 serve the purpose fulfilled by vents
 near the flanks of an pierment, of
 keeping the head sluices free from silt.
 6. With the exception of the pierment
 the head works have suffered no in-
 jury, but as already reported the
 overflow of the Palar breached the
 Poodi tank, and the water from
 the latter breached the Caveri tank
 and Gornidavady Channels, and threw
 an excessive quantity into the Caveri-
 tank tank.
 7. Various wild statements, to which
 I do not attach much credit, have
 been made as to the level to which
 the water rose in the latter tank,
 but there appears to be no doubt
 that the surplus channel was full
 nearly

Ten bridge piers
 kept the current
 away from the
 long wall, and
 thus those were
 undisturbed until
 after the breach
 occurred.
 The undisturbed
 the wind blew the
 water down
 was not much
 used

written so low
 536 feet in 1792
 per.

nearly if not quite up to the crown
 of the piers of the bridge in medi-
 -ately below the tank. Calculating
 so that the discharge must have been
 very great. The tank sustained no
 injury, and I think we may con-
 -tinue ourselves on the result of the
 -work done to it during the last
 two years.
 8. In my letter of 21st of 29th ultimo
 I stated that the flood water enter-
 -ing the Gornidavady Channel had
 carried away the work done for the
 restoration of the bridge on the trunk
 road, but I find that the damage
 done was very slight, being confined
 to the destruction of a small quantity
 of half finished archwork, the piers
 being injured. As the channel
 was blocked up with centering pil-
 -lars &c. this speaks well for the
 way in which the work has been
 done.
 9. The Poney ancient has been
 completely carried away from
 end to end, nothing being left
 but

about the undersluices on each flank.
And as far as can be judged at present,
the destruction of the foundations is
as complete as at the Palam. No
material injury has been done
to the head sluices or the ancient
channels.

10. I have given orders for the im-
mediate collection of materials
for the repair of the two ancient
across the breaches as soon as the
condition of the river allows. Every
effort will be made to get the res-
toration so far advanced during
the next six months as to enable
the June freshes to pass into the
channels. I take it for granted
that no question regarding funds
will be allowed to interfere with
the vigorous prosecution of these
repairs.

11. I cannot find in this office
or in either of the Range offices
any plans or sections of either
Ancient

Several small
plans

+
Ancient, if any such are in your
the Government office. I shall feel
much obliged by their being sent
to me.
12. The Chegar head works have
escaped material injury, the road
embankment having given way and
so relieved the ancient and bridge,
but the channel, as usual, has been
damaged in several places. This
channel has only one bank and acts
as a catchment drain to all the com-
try above it, and will never be in a
satisfactory condition until it is
properly banked, and arrange-
ments made for passing surface
drainage across instead of into it.
13. The Poring tank, the terminal
tank of the Chegar Moori channel,
and one of the largest in the place,
was full. It had a very narrow
escape. The pond was stopped al-
most from end to end, and was
only saved by the fact of the wide
wash. The road passing
along it, and its being therefore of
greater

Each crop drain
should be
with a small
circumstances

greater width than ordinary. And
 metalled on the top. If this tank
 had gone it is hardly possible
 that the Madurantakam tank
 could have escaped. I am not at
 present satisfied as to the true
 cause of this excessive influx of
 water to the Poornay tank. Nor
 therefore as to the proper measures
 to be taken for its future safety.
 But the matter will receive full
 consideration.

14. Of breached tanks the fol-
 lowing are reported.

Handewash	36
Porloor	20
Wallajah	14
Palamur	3
Chittoor	3

But with the exception of the Poornay
 tank none of them are of importance.

15. The floods of this year have
 exposed the imminent danger to
 which the irrigation works and
 the

The mountain
 overflow here
 will be a very
 case, unless
 the water runs
 down a valley
 between high
 ground on either
 side

A large road down
 under the
 chiefest remedy
 but I am told that
 the Municipality
 or local funds will
 be necessary for a
 bridge

the country generally. Along the
 banks of the Palar and Cheyar
 are exposed from the overflow of
 these rivers. Last year was an
 unusually dry one and the evil did
 not show itself, but this year the
 damage done has been very great.
 16. The road from Wallajahpett
 to the Palar ^{canal} has been
 twice breached by the overflow of
 the river above the ^{canal} and on
 the second occasion the damage
 described in paragraph 6 of this letter
 the repair of which will cost not
 less than Rs. 8000 was caused.
 Three times the river has overflowed
 its right bank above Villore and
 breached the road to the railway
 station causing heavy expense to
 the Municipality and immense
 inconvenience to the townspeople.
 Near Pallicondah again about
 seven miles higher up it has over-
 flowed and damaged the road.
 The Cheyar has over and over again
 injured

injured the roads running along its
banks, and estimates aggregating
upwards of Rs. 100,000 have been
found necessary for the repair of
injuries caused by this one river.
Apart from the injuries to public
works, the damage done to crops
by the fields being flooded is very
serious and many complaints are
made by the ryots on this account.
The left bank of the Palur
alone ^{the} ancient will be dealt with
at once in the interests of the
ancient works, and estimates for
the purpose have already been
prepared. With regard to the other
points where improvements are
necessary it will be a question
how far the charges to be incurred
should be considered Imperial,
and how far Local; this however
is a matter of detail, the essential
point being that the subject should
be taken up systematically and
completely. It is obvious that
any

Any work of this nature must
include the construction of head
sluices to the numerous open river
channels, which in their present
condition would simply be so -
many breaches in the embank-
ment.

I have the honor to be
Sir,
Your Most Obedt. Servant.
R. B. P. Captain R. E.
District Engineer, North Arcot

Submitted for the information of Government.

With a view of obtaining the best information possible as to the cause of the breaching of the Polar and Spring Anvils, these works were visited on the 8th and 9th Instants.

2. The Palar Ancient consists of a body wall 6 feet above the first apron, which is of large split stone 10 feet wide, the 2nd apron is of rubble masonry 36 feet wide, and beyond this there was an outer rough stone apron 15 feet wide.

feet wide.

The excellence of the masonry of this weir
I had on previous inspections noticed, and
the present state of this work abundantly
testifies to the careful way in which it was
built. Every part of the masonry which has
been left standing is in good order, the body
wall and the bridge piers held out until
they had been undermined to such an extent
as to cause lengths of many feet to break off
in a mass, and those masses were not
buried in the sand remain without the
displacement

To
 The Chief Engineer
 for Immigration
 Madras.
 Dated 20th Nov 1914.
 Recd 12th Dec 1914.
 No. 2380
 The Commissioner
 Rangoon
 in connection with the
 Western District
 damaged by the late
 heavy fall of rain.
 W. 2456/14
 31/1/14

displacement of hardly a brick, and most of the coping is as firmly fixed as ever on the top of the overturned masses of wall. The bridge piers are about a foot higher than the Ancient crest, and are of brick work unplastered, and I did not see one brick of their top courses missing except on the lower edge of one of the cutwaters, and this I rather think was washed out long ago. The bridge, it should be mentioned, never was completed, but stands as a monument, like that across the same river near Chingleput either of want of sufficient consideration in the first instance of the needs of the Country, or of the absence of that fixedness of purpose without which no good results can be attained. The bridge near Chingleput would have been a work of great utility, and when all the difficult part of it had been done, it came to a standstill, the left complete but still convenient causeway having been destroyed to make way for the bridge. The Palar Ancient bridge would never have been worth its cost, its site being 5 or 6 miles below the point, between Arcot on the one bank and Pancejett on the other, where a bridge would have been of great value.

Ancient bridge.

Cause of damage.

3. As it is certain now that a bridge across the river at the Ancient will not again be proposed, seeing that so much of the work before done has been washed away, it will be advisable to cut down the remaining piers to 2 feet below the crest of the weir, leaving the lower parts to act as small groynes.

4. It is possible that, as Captain Prynne has suggested in para 6 of his letter, the damage to the Ancient may have commenced at the undersluices which occupied a position at its centre. The more detailed examination however, of which the state of the river at the time of my visit admitted, indicates in my opinion very clearly that scour below the outer apron working back and engulfing that, thereby undermining the rubble masonry apron and that of split stone, and so leaving the main wall open to attack, was the direct cause of the breach. The aprons have received no injury whatever from the overfall, indeed from the weir wall to the outer edge of the rubble masonry apron there has been no damage of any kind except the removal of a few square feet of the outer

outer edge of the extended apron at the South side of the Southern set of undersluices, and this was mainly caused by undermining. The outer rough stone apron has with few exceptions, disappeared from sight, and in many places a 10 foot picking rod met with no resistance, but elsewhere stone was found 4 or 5 feet below the surface, and in some places a good deal of stone has merely sunk. The direct evidence of the breaching of the dam having been caused by scour below it is confined to the visible action of this kind at the Southern set of undersluices above referred to, and to the position of one large mass of the rubble stone apron just to the South of the place which was occupied by the centre set of undersluices. This mass has the edge which was nearest the weir wall tilted up about 6 feet and the original surface of the apron is down stream, so that it certainly was undermined and torn off the lower part falling into a hole of very considerable depth.

5. The position of the breach may have been determined by the action of the water passing through the central undersluices coupled with the location of sand banks below

below the dam, and if this latter there is no record. The different degree of displacement of the rough stone apron below the parts of the Ancient still standing shows that the intensity of the action varied considerably, and the scour went on most rapidly where from some local causes, in which may be included a rather marked set off the left bank of the river above the Ancient, this action was the most marked. Nothing is known at present as to the dimensions of the breach at first, but probably most of the damage were caused after the breach by the undermining on the upstream side caused by the water rushing towards the breach. The bridge piers no doubt greatly retarded the destruction, for they had to be destroyed before the foundations of the weir wall were open to attack.

6. The foregoing details have been dwelt upon at some length because in order to provide against future accidents it is necessary to understand as clearly as possible, why this fine Ancient has failed. It was built some 20 years ago, and has never before, so far as I am able to ascertain at the moment, suffered any serious injury of any kind, repairs having been confined to

to pointing the apron, and replacing the sunken or washed away stone of the outer apron. The level of this destructive flood was from $7\frac{1}{4}$ to $7\frac{1}{2}$ feet above the crest of the Ancient, a height from which no apprehensions of damage to it need have been felt.

7. I am able to suggest no improvement of Old section or the old section up to the outer edge of the rubble good one. masonry apron. The central undersluices were not of much, if any, use and they should be omitted from the restoration, but those undersluices which remain uninjured should be retained permanently. The sets nearest the head sluices should continue to be made use of to keep the channel heads clear, while the others should, as a rule, be kept closed. All the revolving shutters should be removed from the undersluice vents, and needle shutters should be substituted, the latter being supported at top by a cross stone, with a second stone in front, and below by two 3 inch round bars of iron. It may occasionally be necessary or desirable to lower the water level in the basin above the Ancient, and for this purpose the efficient undersluices should be retained.

Means of rendering
Ancient safe
in future.

8. at a distance from the channel heads. 143
Security against damage in the future will best be obtained by a material addition to the outer rough stone apron, and by keeping a reserve of stone on the spot for replacing sunken or removed stone. The District Engineer has been requested to provide in his repair estimate for an outer apron of 30 feet width, or double that of the former one, and this is to have a depth of 14 feet at the junction with the masonry apron and of 3 feet at the outer edge, and its surface is to be placed 1 foot below that of the masonry apron. The reserve of stone should be $\frac{1}{3}$ of the contents of the outer apron, or say 3,500 Cubic yards, and for the reasons given in connection with similar reserves in Sangoie, their value should be charged to stock.
As an additional security groynes 45 feet long, and at 90 feet from centre to centre, should be run out from the outer edge of this apron, and at right angles to it. They may have a width of 1 yard at top, and 3 yards at the base, which will be flush with the under side of the outer apron; they will prevent the formation of a channel running parallel to the apron.

within a distance which would be of moment.

The surface stones of the outer apron should be larger. 2 Cubic feet or 300 lbs weight will be a proper size.

Above the Ancut, piers 60 feet long should be placed on the river side of the under sluices next the head sluices or wings, on both sides of the other under sluices, and at about 180 feet intervals between the latter. At their junction with the remaining piers or body wall they should be 2 feet below the crest of the Ancut, and at the outer end flush with the under sluice sill. They will check lateral currents above the Ancut. In other respects the details of the section of the uninjured part of the Ancut should be adhered to.

9 Some erosion of the right bank of the river below the weir took place, and the Chukramellun Channel, which has its head in a raised part of the Ancut at the Southern end, was breached. There has been a proposal to do away with this head, and to supply the channel from the Doony Channel. The feasibility of so doing should be ascertained at once, and, if it be not practicable, the head sluice of the Channel must be raised to 3 feet above the flood of 1874, or 10 feet above crest of Ancut, and the wall which forms the

Chukramellun
Channel head.

the left bank at the head must be raised in proportion, and the bank in continuation of this wall must, for a distance of 100 yards, be strongly revetted on the river side, care being taken, ^{1st} that a yard in thickness of good soil, revetted with maul, is placed immediately behind the revetment, and ^{2^{ndly}} that the latter is founded 5 feet below under sluice sill, and protected by 9 feet width of rough stone apron 3 feet thick placed with its surface 2 or 3 feet below the sill level.

Head Sluices. 10. The walls under the arches of the South Main Channel head sluice have been raised since my visit to the works in May 1873 to 6 inches above the recent flood level, so that no water entered this channel except through the vents which are regulated by revolving shutters which are very difficult to work. No damage was done.

The similar walls of the Northern head sluices should be similarly raised, as they were submerged by the flood water, and there by an addition was made to the quantity of water which found its way into the channel by spill from the river. The Southern flood bank above the Ancut stood

stood well and suffered only slight erosion of the front slope. Its alignment is not good.

11. It will be necessary to ascertain at what points throughout the District the Palar overflowed its banks or breached its embankments, as also the course taken by the water so as to find out flood banks which are liable to be turned are of very little value. Continuous levels of the river bed, with cross sections at intervals and flood levels as often as these can be found out will be requisite to deal properly with this subject wherever the ground on either side of the river is not palpably well above the necessary level, and it must be borne in mind that some of the affluents will also need embanking for a greater or less distance from the point of junction.

12. The state of the Pongy Ancient is some- what better than the District Engineer supposed to be the case when his letter was written, as 256 feet remain out of 492 feet. Here, as at the Palar, there can be no doubt of scour in rear having been the cause of the damage, though why this particular fresh should have caused a breach it is difficult to conjecture. The ancient was seen by the Range Officer Mr. Smithers just before

before the fresh, and the aprons were then in good order. The Engineer says that the apron failed first and the breaching of the weir wall followed.

The aprons were as follows and certainly those of masonry were very ample.

1st Apron 12 feet wide of split stone with a drop of 1 foot at its outer edge.

2nd do - 27 feet of rubble stone in Chinampas 3 feet thick, with a retaining wall 3 feet deep under outer end, and 6 feet well below that.

3rd do - rough stone 12 feet wide except at the under sluices where 10 feet additional width was given and 3 feet thick.

The fresh was about 1 foot lower than those of October 1871 and May 1872, and there was no unusual volume of water therefore to account for the accident - The river bed has been changed so entirely by the sweeping away of so much of the Ancient as to afford now no evidence of its circumstances before the accident. The weir was inspected by me in May 1873 and in a memorandum of instructions sent to the District Engineer it is noted that but little damage had been sustained from the freshes of

12th of the 12th May

of the preceding year, and that only ordinary repairs were required. It was remarked that the crest of the Ancut was rather weak compared with what is usual (it is rubble stone in chain instead of large well shaped stone) but that it appeared to have stood well, and would probably continue to do so if good lime were used for the joints.

A great deal of the body wall fell down stream which indicates that much of the apron failed about the same time. Some of this wall sank almost vertically - where it stood, and the coping is now but little above bed level.

This Ancut was built at about the same time as that on the Palar Vep about 20 years ago, but its masonry whether brickwork or stone is inferior to that of the latter, and it is questionable whether the lime is so good. I saw however no reason for supposing that this had anything to do with the failure, and of course 20 years are a sufficient trial to render it very improbable that faults of construction should have been the cause of the accident.

The disappearance of the outer rough stone apron behind the remaining parts of the Ancut show that this was really the weak point, and it may be noticed that this disappearance

appearance would seem to have taken place before the breach occurred, seeing that sand was thrown upon the two sides of the river below the dam when the current was concentrated in the middle of the bed.

The remedy will be, as at the Palar, a large addition to the width of this apron which should be made 24 feet wide instead of 12 feet, 4 feet thick at the junction with the rubble masonry apron 3 feet at the outer edge, and the surface should be 18 inches below that of the second apron. Also at the suggestion of the District Engineer, Eugene, a retaining wall midway between the body wall and the retaining wall of the 2nd apron will be inserted. Groynes should be run out from the edge of the rough stone apron down stream, and above the body wall up stream, as noticed in detail for the Palar Ancut.

The new body wall should be made somewhat more massive than before, the width of the crest being increased by 1 foot and rounded off at the junction with the old walls. The crest should be of split stone (whole stones) not less than 9 inches thick.

A reserve of stone to the extent of one half the contents of the outer apron should be maintained.

13. Certain improvements to the head sluices in
and under sluices and other precautions detailed in
the Memorandum above referred to have not as yet
been carried out, and they should be attended to at
an early date. Had the fresh of this year been a foot
higher than that of May 1872 there might have been
a good deal of preventible damage done.

14. Government have already had before them the information given in the District Engineer's letter No. 2088 of the 29th October last. It will however be noticed with satisfaction that the head works of the Chegarin Ancient have not suffered materially, but the facts of this flood must be acted upon at once, and a sufficient margin provided against future contingencies. Each drainage falling into the Chegarin Ancient Channel should be dealt with according to the circumstances. It is but seldom financially advisable to pass extensive floods entirely under a Canal, but about 50% of such floods may with advantage be provided for by Aqueducts or Culverts, and for the remainder fully adequate inlets and outlets are the best arrangement consistent with economy. 10 feet a second is a safe velocity of discharge through culverts, and the length of the inlets and outlets should be determined with reference to the maximum level to

to which water in the Canal may be allowed to rise.

15. The construction of head sluices to the several open river channels of the several rivers is, as the District Engineer remarks, a necessity if flood waters are to be confined within embankments and prevented from going all over the Country damaging cultivated lands and breaching tanks.

16. There is nothing now to prevent a bund being thrown across above the breach in the Palan Ancient and a similar bund will be placed above the Pany Ancient. The District Engineer is of opinion that all the irrigation has hitherto been fully supplied, and the quantity of water in these rivers being now small, the bunds will be comparatively easy works to construct, and no time should be lost in collecting the large quantities of stakes, brush wood, and haul or other grass which will be required before operations can be commenced.

Respectfully,
September 1874
Wm. L. L. L.
Leitch. Col. R. E.
Chief Engineer for Irrigation

13. Certain improvements to the head sluices in and under sluices and other precautions detailed in the Memorandum above referred to have not as yet been carried out, and they should be attended to at an early date. Had the fresh of this year been a foot higher than that of May 1872 there might have been a good deal of preventible damage done.

14. Government have already had before them the information given in the District Engineer's letter No. 2088 of the 29th October last. It will however be noticed with satisfaction that the head works of the Chegarin Ancient have not suffered materially, but the facts of this flood must be acted upon at once, and a sufficient margin provided against future contingencies. Each drainage falling into the Chegarin Ancient Channel should be dealt with according to the circumstances. It is but seldom financially advisable to pass extensive floods entirely under a Canal, but about 50% of such floods may with advantage be provided for by Aqueducts or Culverts, and for the remainder fully adequate inlets and outlets are the best arrangement consistent with economy. 10 feet a second is a safe velocity of discharge through culverts, and the length of the inlets and outlets should be determined with reference to the maximum level to

to which water in the Canal may be allowed to rise.

15. The construction of head sluices to the several open river channels of the several rivers is, as the District Engineer remarks, a necessity if flood waters are to be confined within embankments and prevented from going all over the Country damaging cultivated lands and breaching tanks.

16. There is nothing now to prevent a bund being thrown across above the breach in the Palan Ancient and a similar bund will be placed above the Pany Ancient. The District Engineer is of opinion that all the irrigation has hitherto been fully supplied, and the quantity of water in these rivers being now small, the bunds will be comparatively easy works to construct, and no time should be lost in collecting the large quantities of stakes, brush wood, and havel or other grass which will be required before operations can be commenced.

Respectfully,
September 1874
Sunderbans
Leitch. Col. R. E.
Chief Engineer for Irrigation

4. 11. 25 II

P. W. 1874 Dept.
No. 7856

The Chief Eng^r
for Irrigation

The Secretary to Govt.
P. W. D.

No. 1029

Dated 11th Decr 1874.
Rev. 15

Encl. 2

Submits for the
information of Govt.
report on the da-
mage sustained
by the Palar & Poring
Ancients & North
West Dist.

G.O. 239-27-1-75

At 4/4

D.C. 21-12-74
G.O. 19-12-74

1874

Proceedings of the Madras Government
Read the following

From
The Chief Engineer for Irr. (H.E. No 1029 of 11th Decr/74)

The foregoing papers contain
information regarding the damage
sustained by the Palar and Poring
Ancients, and certain works of
irrigation and other works in the
North Arcot District in October
last, together with the remarks
of the Chief Engineer for Irriga-
tion on the probable causes of
the serious injury which the
Ancients have sustained. The
District Engineer will be guid-
ed by these remarks in prepar-
ing his estimates, and in the
for a special report.

W. J. D. S.

19. 12
I to the R. E. Govt.
letter a reply at the
for a special report.

meantime materials must be
 got ready with the utmost
 possible despatch, so that the
 foundations may be completed
 during the most favourable
 season of the year.

2. The Chief Engineer for
 Irrigation will allot such funds
 under repairs Agricultural as
 may be necessary, and he will
 ask for authority to exceed the
 amount at his disposal should
 this be requisite.

Wm 12/12/74

original
 P. W. D.

239
 27-1-1875

Suppose the Agricult-Gent
 has already more to do
 than to be useful for M

Alternative para 2

The work is one of
 reconstruction; rather
 than of repairs; &
 the sort of work
 have already been
 requested to make
 an addl allotment
 of 5000 to meet
 its cost, & that of
 similar emergent
 works, which must be
 carried out in 1875

P. 21-12-74
 11-11-74

Chief Engr for Irrig
 S. G. M. Grant
 Controlder of
 Revenue Dept
 20/1/75

For once admit
 1872. The reconstruction
 and extension, &
 the Agricult-Gent
 or who get work
 out - not order
 execution in ante
 ripation - 1872

1194-1192