

(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. 295-64. 129-131.	Press ~~Mis.~~
Dated 7. 12.	1876.

Not to be folded or roughly handled

No. 129. Read the following letter from the Consulting Engineer for Irrigation and Canal Company, to the Secretary to Government, Public Works Department, dated Madras, 17th November 1870, No. 93:—

I HAVE the honour to report that I inspected the Madras Irrigation and Canal Company's Main Canal from Soonkasala to Cuddapah between the 4th and 31st of October, and to submit the following remarks on the condition of the works:—

2. This work has apparently not sustained any injury this year, the water was flowing 10 inches deep over it at the time of my visit.
Soonkasala Anicut.

3. In Government Order No. 2,352, 29th September 1870, a sum of Rupees 2,900 was sanctioned for repairing the apron and side walls of the head-works.

sluice. This amount appears to have been partially expended, but the work has not stood, and will require renewal. The apron had been partially washed away, and the side or retaining walls of the canal below the head-sluice had been undermined. The Chief Engineer, in a recent report, says, the injury sustained by the apron arises from water passing below the head-sluice and under the concrete apron by pressure when the water in the river is high. It blows up the apron, and he proposes to form a water-cushion by running a low wall across the canal below the head-sluice and between the side walls, and to fill in the present irregularities in the bed with concrete, and it is also hoped that this will have the effect of preventing the set of the current against the side retaining walls which undermines them. The under-sluice discharges silt well, but a good deal still accumulates above the head-sluice.

4. The masonry works generally are in good condition. The bed still requires clearing of rock and stones in some places, and the banks want making

1st Section—From 1st to 17½ mile.
up and trimming, and the tow path to be properly formed. The self-acting sluice or calingulah, sanctioned in Government Order No. 957, 6th April 1870, has been completed in a substantial manner, but the shutters do not fit properly. An additional irrigation sluice, sanctioned for the 9th mile in Government Order No. 3,463, dated 23th October 1869, has not been begun.

5. 6TH MILE.—The two breaches, one at 5 miles 45 chains, the other at 5 miles 52 chains, caused by the floods of August 6th, were being repaired by banks of earth carefully laid and well rammed, and the inner slopes will afterwards be covered by a layer of puddle protected by shingle. Estimates are about to be submitted to Government.

6. 10TH MILE.—Two more large breaches, at 9 miles 6 chains, and at 9 miles 53 chains, caused by the same floods, are being repaired in a similar manner. Estimates in hand.

7. 18TH MILE.—Large breach just below the Hindry aqueduct. The debris has been cleared away, and the foundations for a new face wall dug out; the progress of the work has been seriously impeded by constant rain. The old wall which fell in when the embankment was washed away had been built merely as a facing to the embankment, and was without foundations of any kind. It will be replaced by a proper revetment wall of suitable section and with good foundations.

When the breach occurred some apprehension was felt for the safety of the adjoining abutment of the aqueduct from the rush of water. A water-cushion to break the force of the water, as it falls over the aqueduct when the canal is filling, will now be added.

8. A little below this breach, on the same side of the canal, a considerable portion of the face wall has slipped, most probably from the pressure of the moist bank behind it when it lost the counter-pressure of the water in the canal. It is being rebuilt of strong section with good foundations.

9. 23RD MILE.—The Kadrabagh aqueduct sustained a little damage in the late flood to the apron below the flooring, and to the water-cushion which receives the canal water as it passes over the work in filling the canal. In other respects this work has stood the severe test it had well. The works of this section generally do not call for remark. The banks for the most part are in fair order.

10. 24TH MILE BREACH.—Preparations are being made for repairing this breach caused by the floods of August 7th. The wall at this place, which has for some length been carried away, is in the form of the letter A, the centre part being filled with loose rubble almost rubbish. The banks are substantial enough, but as where they joined on to each end of the wall, which is only 2 feet above water level, they dipped down, and would be still more lowered by the wear of traffic; I have no doubt that the accident occurred in the manner the Executive Engineer supposed, by the floods topping the bank and gradually washing it away.

25TH MILE.—No. 13 calingulah breached in the same storm. It is about to be repaired, and advantage is being taken of the circumstance to remodel the work by lowering the crest 18 inches, the water for this depth in future being retained by planks removable in case of any excess depth of water occurring from floods or other causes. In order to make the canal generally safe in time of floods, the Chief Engineer is about to propose remodeling in a similar way all the calingulahs in that portion of the canal which receives drainage, and to lengthen those calingulahs which are of insufficient capacity, and he also purposes building others at large tanks and drainage basins, wherever there is a doubt as to the sufficiency of the present escapes to pass floods, such as followed on the heavy rains of 6th and 7th August last at Kurnool, all of which proposals I will be prepared to support.

11. 28TH MILE BREACH, AUGUST 7TH.—This breach is in a high wall across a deep ravine somewhat in the form of the letter A, the centre purporting to be filled with dry rubble packed, but it appears to be rubbish. The repair intended to be made is a substantial revetment wall with counterforts backed by a massive bank.

33RD MILE.—The second-class bridge, sanctioned in Government Order No. 3,177, 1st October 1869, in lieu of the ruined Sultanpore tunnel, consists of the usual three arches over the canal and two land arches in place of wing walls. The piers and abutments are up, one arch keyed, and the others commenced; the amount remaining available for expenditure on the 1st July last that is provided in the general statement was Rupees 5,593 which I believe to be quite sufficient.

There is no other new work in these sections, and the only other important injury sustained from late floods is at the Ullur aqueduct, where the water in the vagu came down in an impetuous torrent tearing up compact kunkur in deep trenches, and the water rose so high as to flow over the parapet into the canal, then, as the flood drained off, the scour of the pent up water in the canal pouring through a breach into the vagu undermined the face wall of the aqueduct. The Executive Engineer's proposed arrangements for repairing the injury, and for providing for the future safety of the structure, seem judicious, and an estimate of the cost is being prepared. The area to be irrigated under the 4th Section is 14,807 acres in the first range or sub-division, for which Rupees 28,929 was sanctioned in Government Order No. 2,882, 10th September 1868. These works are nearly completed.

12. In the second range there are 10,511 acres to be irrigated, for which Rupees 17,847 were sanctioned in Government Order No. 2,395, 5th October 1870. The work is not yet begun.

13. No new works have been done in this section since I last inspected it. The banks in some places are by no means in as good order as they should be. The inner-slope of the left bank, on which the tow path is, requires clearing of bushes. The bank is inconveniently narrow in parts, having worn away and become rounded by the weather.

14. The Terragopilly aqueduct leaks a good deal more than last year, the water spouting out in every direction with only 6 inches water in the canal, but it does not appear that the leakage will affect the stability of the work. The other masonry works are in good order. No provision has been made in the statement of 1st July, of value of work remaining to be done, for reforming the banks where necessary, and levelling the tow path. The distribution works, sanctioned in Government Order No. 2,256, 19th September 1870, are being commenced, the land is being taken over, and the channels marked out. The area to be irrigated is 9,516 acres at an expenditure of Rupees 20,550, or Rupees 2-2-7 per acre.

15. LOCKINSULA TO JOOTOOR ANICUT.—The masonry works in this section which were incomplete last year are thirteen locks, all of which, so far as the masonry is concerned, are complete with the exception of a little finishing. The lock gates are being swung and the sluice rolling shutters are being fixed. The gates were made at Bowanassy Workshops, and, as would be expected, are much inferior to those made at Madras. The earthwork is mostly finished, and where the canal passes through cotton soil or other soft material, the banks are in fair order, but their tops, having been rounded to prevent them wearing into holes, are inconveniently narrow, and where the cutting is in shale or kunkur the banks require a good deal of forming, levelling, and trimming. I examined the account of work remaining to be done, and it appeared to me that suitable provision has been made in the statement of 1st July. The Vellapanoor bridge at miles 87-12 has been completed in a substantial manner.

16. Just below lock No. 8, at miles 89-63, where a vagu breached the banks last year, a culvert, with two vents of 12-feet span, and which was sanctioned in Government Order No. 518, 14th February 1870, has been built.

17. The distribution works, sanctioned in Government Order No. 1,226, 10th May 1870, are in as active progress as the weather will allow, two-fifths of the earthwork is done, and the masonry works are commenced. The rates allowed for masonry are lower than what were only found sufficient for the large works on the Main Canal, but the Executive Engineer hopes not to exceed them. The area to be irrigated is 27,970 acres at a cost of Rupees 71,400, or Rupees 2-8-6 per acre.

18. JOOTIOR ANICUT.—The anicut and all head-works, except a little to the lock, have been completed of sound and substantial work; the floods of the past season are reported to have passed over the anicut at a maximum depth of 4 feet and without doing any injury. The height of water seems low for a season of unusual rain. Stone steps at each end of the anicut for facility of passage across it are required. Silt in large quantities is deposited above the head-sluice and above the head lock, and it is doubtful to me if the under-sluices, owing to the distance and the position in which they are placed, will even keep the head clear.

19. Work No. 3, a second-class bridge in the 94th mile, of which the centring was up at my last inspection, has been completed. Work No. 6, a calingulah in the 97th mile, which had not been begun, has also been completed. The canal at this point receives a large supply of water from a vagu to allow of the escape of the surplus of which this calingulah was built; a breach in the lower or right bank of the canal has occurred immediately below this calingulah. The cause is unknown, but it is supposed to have arisen from vermin burrowing in the dry bank. Work No. 7 A, a second-class bridge, of which the piers and abutments were up at last inspection, has been completed. Work No. 8, a culvert in the 99th mile, which appeared to me of rather small capacity, has sustained some injury, the silt trap has sunk, and the north wing wall has given way. Work No. 9 in 99th mile, a calingulah, which had been partially built, has been replaced by a new one and a detached scouring sluice, sanctioned in Government Order No. 1,103, 26th April 1870; the work has been completed. Work No. 11 A in the 102nd mile, a bridge, which had been finished, has lost its parapet walls; they fell off owing to bad work and the peculiarity of the design by which the parapets partially hung over the face walls. The masonry of all this structure is much inferior to the work in general of late years.

20. All bridge approaches in this part of the canal are very incomplete.

21. In the 107th mile, the lower of the two aqueducts over the supply channels of the Nundial tank has sustained some injury, there being several spouts through the arch up from below owing to the pressure of the water in the channel.

22. In the 109th mile, work No. 22, a culvert of six vents of 5 feet, has blown up. It will require to be rebuilt, and the capacity of the culvert to be enlarged. The rest of the masonry works in this part of the canal are in good condition.

23. As regards the earthwork, there is more grass and other vegetation on this portion than anywhere higher up, nevertheless, the slopes of banks and cuttings are much guttered, and there was little appearance of any repairs being done. The number of bankers maintained, namely, one for 3 miles, is quite

insufficient where the banks are not consolidated, much of the work that will now be necessary to make up the banks might have been saved by timely repair. The money allowed in the 1st July statement gives an average of Rupees 665 per mile for completing cutting, forming banks, trimming, etc. It is a tolerably large average, and I hope may prove enough, but it is not work that can be accurately estimated or that should be given on contract. The more carefully it is done under close departmental supervision, the more economical it will be in the end. These remarks apply to the 7th Section generally though the upper part is by far the worst. Work No. 24, an 8-foot culvert, which had not been begun last year, has been completed. No. 24 A, a third-class bridge in the 111th mile. The centring is being put up.

No. 25, a culvert four vents of 8 feet not begun at last inspection, has been completed. No. 25 A, a second-class bridge not begun at last inspection, has been completed, except in its parapets and roadway.

No. 26, a culvert of two vents of 8 feet in the 113th mile, has been completed.

No. 27, a first-class bridge called Deepaguntla in the 113th mile, of which the piers and abutments were up at last inspection, has been completed.

24. The first instalment of irrigation under this section is 12,000 acres, and the distribution works are estimated to cost Rupees 44,660. The plans and estimates have been examined, and are about being submitted to Government.

25. 116TH MILE.—The 8th Section and the Yallur Sub-division begin at this point.

26. In the 117th mile an additional bridge of the second class, called the Jillala bridge, and which was sanctioned in Government Order No. 1,712, 18th July 1870, has been completed, except the parapet walls and the roadway.

26. In the 118th mile, that is at 117—46, No. 1 lock is situated. Its masonry is all but finished, and the gates are being hung. The small calingulah in the left bank, for passing water round the lock, is nearly completed. The large calingulah with scouring sluice in the right bank, and which is to discharge all the water coming down the 7th Section, Main Canal, that may not be utilized or be required for the 8th Section, and which was sanctioned in Government Order No. 2,063, 26th August 1870, has not been begun.

27. At 119—15 is situated lock No. 2, which is almost complete, as is the calingulah in the left bank. The lock gates are being put up; the bridge over the tail bay is not yet built.

28. The masonry works are in good order, the banks are much better than in the 7th Section, the canal has been taken out to full depth and width, and the banks made up since last inspection; they are in tolerably good condition. I compared the condition of the unfinished works with the 1st July statement of value of work remaining to be done, and I am of opinion that sufficient funds have been provided except in one or two cases.

29. From Yallur to Chintacoontah, 119—35 miles to 131st mile, I was unable to inspect the line here fully, owing to the extreme inclemency of the weather, and the difficulty, I might say impossibility, of riding along the banks. The following

particulars I obtained from the Executive Engineer, with whom I talked over the condition of each work and the funds that would be necessary to complete it:—

Lock No. 3.—A little work remains to be done to the cills and coping, and the gates and sluice valves are not yet fixed.

Lock No. 4.—There are from 6 to 700 cubic yards of masonry still to do; gates and valves to be fixed.

Lock No. 5 is far advanced towards completion.

Lock No. 6, 125th mile.—The masonry is finished, the upper gates and valves fixed, and the calingulah nearly completed.

Lock No. 7, 125th mile.—The masonry completed, the upper gates and valves fixed.

Lock No. 8, 126th mile.—The masonry completed, the upper and lower gates and valves fixed, the calingulah far advanced.

Lock No. 9, 128th mile.—Masonry complete; upper and lower gates and valves fixed; calingulah begun.

Lock No. 10, 129th mile, is quite complete, except to hang the lower gates.

Lock No. 10A 131st mile, is all but complete, the upper and lower gates and all valves are fixed.

30. *EARTHWORK.*—The canal as far as Chintacoontah has been excavated to full depth and width, but requires to be cleared out and the banks to be made up.

31. From Chintacoontah to Rajoli is 15 miles, in which the following masonry works are:—

Lock No. 11, 134th mile.

„ „ 12, 138th „

„ „ 13, 139th „

„ „ 14, 142nd „

„ „ 15, 144th „

„ „ 16, 145th „

all these locks are pretty much in the same condition as those higher up in the 8th Section. The masonry is complete except a little finishing, and some gates and valves begun to be put up.

32. *Lock No. 13* leaks badly from the water in the upper reach, owing to interstices in the masonry through which the water spouts.

33. The condition of the earthwork varies very much, but on the whole, although much more advanced towards completion, the banks are in a worse condition than they were a year ago. Banks which have been recently repaired are tolerably good to the sight; those made sometime before, and which have been left unrepaired, are terribly guttered, as are the slopes of cuttings and even solid berms; none of the banks are consolidated, and riding on them is laborious and difficult. A stream which passes under a culvert in the 145th mile, and which has turned abruptly, has injured the banks of the canal, and it will be necessary to turn the course of the stream.

34. I cannot take any exception to the sums provided in the Chief Engineer's statement for completion of the works in the 7th and 8th Sections, excepting bridge No. 24 A on which the work remaining to be done on 1st July is valued at Rupees 1,333, and which at the time of my visit, more than three months later, seemed

quite insufficient; also work No. 25, another bridge, had Rupees 2,311 provided for it, and which seemed to me much in excess of what is necessary.

35. The Executive Engineer has suggested that the bridge which was intended to be built over lock No. 16, and sanctioned in Government Order No. 514, dated 22nd February 1865, should be dispensed with. This lock is situated just above the Rajoli anicut on the Kunder river. It does not appear that there ever was a passage across the river in the immediate neighbourhood, and the construction of the anicut renders such a passage more impracticable. Moreover, there is a bridge in connection with lock No. 15, which is all that the cart traffic of the locality requires, and foot passengers could be accommodated with a wood platform attached to the upper gate of lock No. 16. The bridge proposed to be dispensed with might be built at lock No. 13 at 138th mile 3,220 feet, where one is very much wanted, the adjoining bridges being $4\frac{1}{2}$ miles apart. The villagers met me at lock No. 13, and were very earnest in their desire for a crossing. I believe they would, if necessary, bear a portion of the expense, and if the Chief Engineer proposes the alterations, I am prepared to recommend them.

36. The Rajoli anicut, the masonry of which was completed sometime ago, is in very good order; sluice shutters 9th Section—From Rajoli anicut 146th mile to 178th mile. have not yet been fixed except temporary ones to the head-sluices. The

under-sluices will, I am sure, answer well, and keep the head clear. The general condition of the masonry works corresponds to those already described. The bridges built sometime ago are in good order. The locks are nearly finished, some gates are up, and some sluice valves are fixed. The banks, as far as Edimudicah, a distance of 7 miles, are in much better condition than on any other part of the canal. The canal has been excavated to full dimensions, but there is of course some silting up at the toe of the slopes. The banks are much more consolidated, less guttered, and in better shape than elsewhere, which I attribute to their having been formed with greater care in the first instance, and to the different system that has been maintained in regard to their periodical repair. It is true the weather had cleared up by the time I reached the 9th Section, and that the banks were drier, but their superior condition was chiefly owing to their having been repaired after each rain.

37. The Vaikalair aqueduct is in good order, but leaks somewhat.

38. Half a mile above Dhoor in the 161st mile the land is flooded at a mangoe tope, where there is a difficulty in draining for want of sufficient fall on the opposite side of the canal, and there are similar occurrences near the Dhoor bungalow, and between these and Penchapad; the Executive and Deputy Chief Engineers propose cutting channels parallel to the canal to drain the water under the neighbouring aqueducts, which will probably answer.

39. At the Beempad culvert in the 166th mile, one arch of which is intended to be used as a traffic way, the villagers complain sadly of the inconvenience they are put to in wet weather from its filling up with mud. I look upon it as a poor make-shift for a traffic way at any time, there not being room for a loaded bandy, and in wet weather it is quite impassable except for foot passengers, and for them

it is unsuitable. An over-bridge ought to be built where there is rising land in the vicinity, for there is no good crossing, that is a bridge, in a distance of more than 10 miles.

40. Two breaches recently occurred in the banks between Dhoor and Peechapad when there was only one foot of water in the canal; the banks in contact with the water appear to melt away, and as the lower portion wastes away the upper part falls in when a regular breach occurs in the bank, and the water runs out.

41. Some 3 miles in length of the left bank at this part of the canal is too soft for any traffic. The spoil has all been spread to the level of the tow paths which has a neat appearance, and compares favourably with other portions of the line; but the great breadth of flat surface necessarily exposed to the rains takes up much water. The surface of the banks should be gently sloped outwards to throw off the rain, or the canal will be seriously injured.

42. The 9th Section ends a little below lock No. 8 at 178th mile. The condition of the locks in this remaining portion is similar to those higher up. The masonry all complete, the gates and sluice shutters in course of fixing. The other masonry works are in good condition, except that the syphon sluices fill up and require being cleaned out periodically. The condition of the banks is very variable, much in this lower portion is a good deal cut up.

43. The iron frames of sluice valves, all of which have been made in England, are said to be not in accordance with the drawings agreeably to which the locks have been built, and there is a difficulty in fixing them, sufficient space not having been left when the locks were built; it is now necessary to pull down part of the upper sluice chamber both in this section and in the eighth. I also notice that the iron frames are being fixed on a substantial wooden frame work which I think is very judicious, but I doubt if it was the original intention; the cast-iron frames look as if they were to be bolted to stone, and the plugs for that purpose are being dispensed with, and it is proposed to cut them off. The Chief Engineer's attention is required to this matter.

44. DISTRIBUTION WORKS.—Plans and estimates for the irrigation of 17,000 acres have been prepared and are now before the Chief Engineer, and further projects are being investigated.

10th Section—From 178th mile, that is about 2 miles above the Pennair, to 188th mile.

45. From the commencement of this section to the Pennair, the canal is very unfinished.

46. TAIL LOCK INTO PENNAIR.—The masonry is about half done and the north-west wall three-quarters finished.

47. ADAMAPULLY ANICUT.—The portion of that work which is founded on rock still requires to be raised 2 feet 6 inches; of the part on wells the main wall has to be raised similarly, and the upper pitching is not yet done, but 1,800 cubic feet of stone for it is ready quarried and dressed. The work has not sustained any damage from the freshes of the past season, and so little cause is there for apprehension of a scour along the face of the work, that it is proposed to dispense with the protec-

tion of a bank of rubble and groynes which I have reported on in a separate communication. Head-sluices are complete and the shutters are up, so is the masonry of the under-sluices, except the upper flooring, and its shutters are being fixed.

48. HEAD LOCK.—The masonry is almost finished, and the flood gates are up. The lower gates not yet fixed and sluice valves not received.

49. I do not think there is any reasonable doubt about completing this work in time, and the money should certainly suffice, unless there are greater charges in the Agent's Office than the Executive Engineer expected for stores and store charges which could not be anticipated.

50. The canal below Adamapully is 8 miles long, of which the 1st and 2nd miles are incomplete, there being a good deal of rock still to be taken out, and the slopes to be formed. The last mile is not yet excavated. The rest of the earthwork is, for the most part, complete. The masonry works incomplete are the scouring sluice at the end of the Main Canal, and the arch of the last culvert in the 178th mile remains to be turned. The other masonry works are complete, except coping and a little finishing.

51. The Punkal Wunkah aqueduct appears in good order and not to have sustained any injury from the freshes of the past season. There was some apprehension that one abutment might be undermined from the scour, and certain protective works at a cost of Rupees 867 were sanctioned in Government Order No. 1,624, dated 7th July 1870, which appear to answer, and will, it is hoped, avert all damage. The formation of the banks in this section has been well done, and the Executive Engineer expects he will have a saving on this item. I passed up this section in a boat in the first week of October to inspect the Adamapully anicut, when there was but 5 feet of water in the canal. The banks appeared quite sound, yet in the night of the 6th, a breach occurred in the bank near the Punkal Wunkah aqueduct, and all the water ran out. The supposition was that vermin had burrowed in the banks when dry; the breach was repaired and water re-admitted before my arrival again at Adamapully at the end of the month, when on the night of the 29th a similar breach occurred close to where the old one had been. There is reason to believe that the canal at this place traverses what was at some former period the bed of the Punkal Wunkah, and that quicksand, some depth below the ground surface, is put in motion when the water in the canal percolates to it, which entails the sinking of the banks; a careful examination into this matter will be made when repairing the present breach, and it may be found necessary to dig a trench along the toe of the bank to be filled with clay puddle. The banks near the breach seem well made and sound, and grass had grown over them satisfactorily.

52. The distribution works in this section, as at present intended, are calculated to irrigate 4,200 acres, for which plans and estimates are now before the Chief Engineer.

53. GENERAL REMARKS, APPEARANCE OF EARTHWORK.—Water having been passed down the canal for a distance of 75 miles last season, or to the end of the 5th Section, I had hoped on the present occasion to have found a marked improvement in that portion of the undertaking, but in consequence of the breaches caused by the floods of the 6th and 7th August, the canal was almost dry, and it presented a very

unfinished appearance in comparison with what it is when tolerably full of water; no one part having ever been entirely completed, that is, rocks and stones still require to be removed from the bed in some places, portions of the bed to be excavated in others, slopes of cuttings to be trimmed and repaired; the tow path to be cleared of spoil and levelled, and the banks to be put in shape, cleared of bushes and trimmed.

54. In my letter as per margin I reported on the condition of the works generally, and the financial position of the Company, and intimated my intention of verifying the statements of the work remaining to be done; and the Government, in Order No. 2,555, 27th October 1870, said they would await my further report on the subject. I accordingly had with me throughout my inspection the Chief Engineer's detailed statement of the value of work remaining to be done on 1st July last, the total of which is embodied in my report quoted above, and I compared the conditions of the masonry works generally, and the earthwork remaining to be done with that statement, making minute enquiry in many instances, and I feel satisfied that there should be no difficulty in completing the Main Canal and the works on it, before the 30th June 1871, and that the funds shown in my former report as available will be found sufficient for the completion of the works, so far as the word completion means excavation of the canal to full depth and width, putting the banks in section, and finishing all the masonry works, locks, bridges, weirs, etc., on the Main Canal, for the Engineers generally assured me that the statement referred to included all sums due to contractors for work done before the 1st July last, and I was unable to discover any discrepancy of importance except that the Company's Officers had estimated salaries from 1st July 1870 to 1st July 1871 as twelve months instead of thirteen, but, as I had added 36,528 Rupees under this head in my statement to Government, the error is not of consequence. Although, however, I quite expect the canal to be finished to the extent mentioned above, I must not be understood to mean that "the Main Canal with all distribution and other subsidiary works will be in every respect complete and put in a thoroughly safe and perfect working condition," for I am of opinion that a considerable time must elapse, and much periodical repair will be necessary, before the banks are consolidated and in a thoroughly serviceable condition, before, in fact, the tow path will be fit for use in the rainy season, the only time when the canal will be navigable. It is to be remembered also that consequent on the late breaches there will be no opportunity of testing the works in the upper portion of the canal, the portion where danger and disastrous breaches are most to be apprehended, before the 30th June 1871, and that the full depth of water will never have been passed down; also that in all probability not one lock on the whole line will have been tried, and although the work of late years has been very good, locks are not work that could be passed as thoroughly safe and in perfect working condition until each one had been fully tested. Neither can I speak at all confidently regarding the completion of the distribution works by the 30th June 1871, and I have no hesitation in saying, that, apart from the contract, it is not for the interest of the Company, the Government, or the country, that they should be so completed. The Company's Engineers will I am sure spare no exertions to get them completed in time, with the object of showing that the contract has been fulfilled, but the

most sanguine cannot expect that even if completed they will be utilized for a long time to come, and before that time arrives the channels will be filled in, the banks broken down, and the masonry works considerably injured; in fact, a large proportion of the amount that is going to be spent on distribution works will be simply lost.

55. REPAIRS.—I have in a former part of this report noticed the present deteriorated condition of some of the earthwork for want of timely repair, and having paid a good deal of attention to the subject, I have to record more prominently my belief that the annual repair of this canal will be a very heavy item, for there are many adverse circumstances to conduce to it.

56. The canal being dry for more than half the year is one, for there can be no doubt that vermin do burrow in the banks and make holes that sometimes lead to breaches. On this subject the Chief Engineer, in his report for August 1870, says, "In the 5th mile there is one place in 2 or 3 feet cutting where a hole 2 feet 6 inches in diameter and nearly round goes right through the bank just above the ground, and in three or four more places holes as large but not so well defined have been made, such banks might become safe if under a constant head of water in the canal, but cannot be depended upon with an inconstant supply." The banks and slopes of cuttings are much more guttered and cut up by rain when the canal is empty than if it was full. No provision has been made for turfing or revetting the slopes throughout, and the cost would be so enormous no one would like to recommend it, and yet without such protection, at any rate to the slopes in soil where grass does not grow readily, the wash from waves in windy weather, or those caused by navigation, will be very destructive. The tow path, too, is unmetalled and is easily cut up by rain; altogether, I do not think that the annual expenditure on ordinary earthwork repairs, exclusive of the cost of maintenance establishments and special repair of breaches, can be estimated at less than 56,000 Rupees, or 300 Rupees a mile.

57. REVENUE.—The following statement exhibits the present prospects of revenue:—

Section.	Area to be irrigated according to distribution schemes.	Area actually irrigated in 1870-71.	Estimated net revenue, 1870-71.	Actual revenue collected and expected now for 1870-71.
			RS.	RS. A. P.
1st	1,386	1128 22	78,666	11,857 9 4
2nd	1,956			
3rd	9,837			
4th	25,318			
5th	9,516½			
6th	27,970			
7th	12,000			
8th	11,737			
9th	17,000			
10th	4,200			

58. In the order as per margin passed on my report of the injury sustained by the canal from the floods of the G. O. No. 2,376, 1st October 1870. 6th and 7th August last, the Govern-

*Proceedings of the Madras Government, Public Works Department,
7th December 1870.*

ment expressed a hope that the Company would now recognize the necessity of strengthening all embankments of doubtful stability, and that His Excellency in Council would look to the Consulting Engineer to assure himself that this is being done.

59. The first thing to be done in literally obeying this order would be to raise all the masonry walls, puddle core walls, puddle lining, etc., to put the Main Canal apparently in a condition to carry 18 inches excess depth of water, in order by such a test to discover all the weak points in the banks and walls, and I had a conversation with the Chief Engineer on the subject after receiving the order of Government quoted above. Mr. Latham's idea now is to lengthen certain calingulahs, build others, and lower the crests of all in the upper part of the canal to 6½ feet above bed level, whereby the ordinary depth of water in the rainy season being kept at that figure, and the calingulahs or waste weirs being capable of discharging at 18 inches depth all excess water estimated at one inch per hour of rainfall for area drained, the water could not rise in the canal more than 8 feet above bed, and when the full depth of 8 feet of water is required it will be obtained by shutters in the weirs. In a recent report, the Chief Engineer says, "I have no doubt that the canal will never be safe unless the calingulahs are sufficient to pass off all rain water safely." It is satisfactory to find that the Chief Engineer has arrived at that opinion, for it is the first step towards putting the Main Canal in a safe condition. I believe, too, that this plan, whereby the water in the canal will be prevented from ever rising above 8 feet over bed, will be far preferable to testing the canal to a greater depth and incurring the much larger expense of strengthening the walls and banks sufficiently to bear the pressure of 18 inches or 2 feet excess depth of water. The Chief Engineer is preparing designs in accordance with the above view, and in submitting them I will report further on the subject.

60. I will only now observe that no funds are provided for this work, and I do not know whence the Chief Engineer expects to obtain them, but I believe the cost of this alternative plan, namely, rendering the calingulahs capable of discharging all drainage water with a depth of 18 inches on their crests, will fall far short of the expense that would be necessary for the other precautionary measures as required by Government Order No. 3,195, 15th October 1867, and Government Order No. 2,376, 1st October 1870, that is for raising all the walls and banks sufficiently high to admit of the test that I recommended being with safety applied, and if the calingulahs are remodeled and enlarged so as to discharge with safety all drainage water that can enter the canal on the data of one inch an hour for twelve hours as in August last, it is clear that the level of the water in the canal never can rise above 8 feet, and there would no longer be any necessity for applying the extra 2 feet tests as I had recommended.

61. Then, as regards the cost of the work remaining to be done, the Chief Engineer's statement of July 1st does, I believe, provide for all except the remodeling and enlargement of the calingulahs and the construction of additional ones, the repairs to the banks in the 5th section, and the repairs of buildings, of which no mention is made at all.

62. In a recent report on the financial position of the Company, I gave Rupees 6,33,523 as the approximate difference between the Chief Engineer's total value of work remaining to be done, and the unexpended balances of estimates.

*Proceedings of the Madras Government, Public Works Department,
7th December 1870.*

I here enter a comparative statement more accurately prepared, and which exhibits even a greater difference, and in some cases marvellously large items, which can only be called savings, but which I regret I cannot explain, except that in regard to the Soonkasala anicut works and the 2nd Section, large sums were lately passed or applied for to cover past expenditure by adjustment of book entries. In some of the other sections I was aware that considerable savings were expected, but I am quite unable to account for those in the 6th, 8th, and 9th Sections, and will call for an explanation from the Company's Officers.

	Balance of Estimates sanctioned and to be sanctioned on the 1st July 1870.	Mr. Latham's Estimate on the 1st July for completion.	DIFFERENCE.	
			Balance of Estimate.	Excess of Estimate.
	RS.	RS.	RS.	RS.
<i>Main Supply.</i>				
Anicut and head-works at Soonkasala ...	48,039	4,366	43,673	71,775
Do. do. at Adimappully ...	28,016	99,791	7,692	7,692
Main Canal, 1st Section ...	1,23,799	12,203	1,11,596	...
Do., 2nd do. ...	72,212	14,751	57,461	...
Do., 3rd do. ...	78,131	127	78,004	...
Do., 4th do. ...	18,213	5,443	12,770	...
Do., 5th do. ...	1,69,074	53,503	1,15,566	...
Do., 6th do. ...	1,19,134	1,17,238	1,896	...
Do., 7th do. ...	1,05,689	62,612	43,077	...
Do., 8th do. ...	3,02,671	88,562	2,14,109	...
Do., 9th do. ...	1,14,849	73,221	41,628	...
Do., 10th do. ...	...	...	...	...
Total ..	11,79,827	5,39,514	7,19,780	79,467
<i>Distribution.</i>				
Branch channels and sluices, 1st Section ...	2,017	550	1,467	135
Distribution, 2nd Section ...	1,385	1,520	...	540
Do., 3rd do. ...	1,052	1,592	...	4,954
Do., 4th do. ...	7,004	11,958	...	...
Do., 5th do. ...	24,456	22,500	1,956	6,731
Do., 6th do. ...	68,503	75,234	...	...
Do., 7th do. ...	99,000	99,000	...	...
Do., 8th do. ...	16,500	16,500	...	...
Do., 9th do. ...	97,245	82,500	14,745	...
Do., 10th do. ...	12,100	12,100	...	...
Do., 10th do. ...	296	...	296	...
Kurnool town water supply ...	...	...	...	...
Constructing a bund across the canal in the 45th mile, 4th Section ...	3	...	3	...
Total...	3,29,561	3,23,454	18,467	12,360
Buildings ...	24,885	...	24,885	...
Cost for repairing breaches ...	73,018	73,018	...	...
	97,903	73,018	24,885	...
Grand Total...	16,07,291	9,35,986	7,63,132	91,827
Saving in estimated amount as appears from Mr. Latham's estimate of 1st July for the completion of works ...	...	...	...	6,71,305
	...	...	7,63,132	7,63,132

63. TELEGRAPH.—The line was completed sometime since for the whole length from Soonkasala to Cuddapah through all sections, and there is a branch line from the Hindry Division office at Kurnool to the Chief Engineer's house, by which he is in direct telegraphic communication with each Executive Engineer. The line consists of a single wire, the branch line to the Chief Engineer's house can be connected with the wire from Kurnool to Cuddapah, or with that from Kurnool to Soonkasala, but it cannot be connected with both; at present it is connected with the line to Cuddapah, the Chief Engineer considering it of greater importance that he should have immediate intimation of any accident below Kurnool; and the Soonkasala line has a separate instrument and battery in the Hindry office. It is of so much importance, when an accident does occur in the Main Canal, that the head-slucies at Soonkasala should be immediately closed; I would recommend the Chief Engineer to have a second line from his house to the Soonkasala line at the Hindry office in Kurnool, by which means he would be in direct telegraphic communication with the head-works.

64. In the course of my inspection of the canal I had many opportunities of seeing how useful an adjunct the telegraph is, and the importance of maintaining it. It is intended to be kept up permanently, but it has the appearance of being merely a temporary line, as the poles which carry the wire are very slight, and would not stand in a gale. The Chief Engineer, however, considers that they have answered expectation and they are stated not to have been attacked by white-ants; but not having been supplied by the Forest Department at the time promised, some were felled when the sap was flowing, which have rotted and require to be replaced. A special officer is now proceeding down the line to see that all poles are securely fixed in the ground, and to complete repairs rendered necessary by recent floods. The instruments are for the most part worked by the Engineers, and the establishment of signallers maintained is trifling. This subject will be more fully reported on when I reply to Government Order No. 2,424, 7th October 1870, disallowing the revised estimate for the line of telegraph pending further explanation.

No. 130. ORDER THEREON, 7th December 1870, No. 2,963.

IRRIGATION, No. 11.

In his letter of the 3rd October 1870, No. 77, recorded with Proceedings, No. 2,555, dated 27th October 1870, the Consulting Engineer for the Madras Irrigation and Canal Company, when reporting upon the present state and progress, and general financial position of the Company's works brought to notice that the sum of Rupees 9,35,985 estimated by the Chief Engineer to be the value of work remaining to be done on the 1st July 1870, was considerably below the amount of the unexpended* balances of estimates and greatly short of the sum† available on that date.

* Rupees 15,69,503.

† Rupees 16,27,064.

2. Colonel Carpendale was of opinion that the difference between the estimated value of work remaining to be done and the unexpended balances of estimates, amounting to Rupees 6,33,503, might probably include payments of various kinds to be made for works already executed, and with a view of satisfying himself as to this and of the general condition and prospects of the Company's works he intimated his intention of making a personal examination of the canal.

3. The letter recorded at the head of these Proceedings contains the results of the Consulting Engineer's inspection extending over the period between the 4th and 31st October 1870.

4. On an examination of the statement appended to paragraph 62 it is observed that the difference alluded to above is greater than was formerly supposed, and amounts to Rupees 7,63,132. Colonel Carpendale in most cases is unable to afford a satisfactory explanation of the causes of this difference, but he promises to institute further enquiries of the Company's Officers. The result of these should be laid before Government with the least practicable delay.

5. The Consulting Engineer is of opinion that no difficulty should be experienced in completing the Main Canal and the works on it within the stipulated time, and that there are sufficient funds at the disposal of the Company for the purpose, but he does not consider that "the canal with all distribution and other subsidiary works will be in every respect complete and put in a thoroughly safe and perfect working condition" by the date in question, and he points out that, notwithstanding the care with which the works have been executed of late years, a considerable time must elapse, and a heavy outlay be incurred before the embankments can be consolidated and rendered safe, the locks tried, and the canal generally placed in a complete and perfect working condition.

6. From this it would appear that although, as far as yet can be seen, the monies at the disposal of the Company will suffice to complete the canal by the 1st of July 1871, so far as a work of the kind can be said to be completed before it has been subjected to trial and undergone the test of a full supply of water, it is evident that the work will not be in a fit state for use till a much larger sum than the amount of the original capital of the Company and of their loan is expended upon it. The financial prospects of the work would thus appear to be far from satisfactory, and they do not appear more promising when the probable returns to be derived, within any reasonable period of time are compared with the heavy expenditure that has been incurred, or may still be necessary. Every possible exertion is, it would appear, being made to complete the system of distribution under the various sections of the canal to all the land capable of irrigation from it, but this is a work which, in the opinion of the Consulting Engineer, and likewise in that of the Government, can scarcely with advantage be hurried. Time is required to familiarize the people with the idea of introducing so great a revolution in their agricultural operations as is involved in the change from dry to wet cultivation—experience is necessary to satisfy them of its advantages—and finally the doubts they cannot but entertain of the regularity and permanency of the supply of water must be removed. Extension of irrigation is therefore of necessity likely to be very gradual, while the revenue derivable from it for years to come, will, the Government fear, probably be so inconsiderable as not to cover the cost of the working and maintenance charges which, owing to the special circumstances of the canal, will almost certainly be exceptionably heavy.

7. If then the funds remaining at the disposal of the Company be not much more than sufficient, as the Consulting Engineer seems to think, to carry on their operations till the beginning of next July, the question arises of how money is to be provided for the considerable and probably heavy expenditure that will have to be continued not only on the maintenance and working of the canal, but on such

*Proceedings of the Madras Government, Public Works Department,
7th December 1870.*

additions and strengthening operations, as there is no doubt will be needed before it can be placed in a secure and thoroughly efficient state.

8. A copy of these Proceedings will accordingly be forwarded to the Government of India with a view to such action being taken by that Government, in connection with the Budget allotment of next year, as the circumstances may seem to demand.

9. His Excellency the Governor in Council cannot but agree with the Consulting Engineer in thinking that, instead of completing the works of distribution at once as if all the land intended to be supplied were likely to be taken up for irrigation without hesitation or delay, it would be preferable so to carry them out as to make them keep pace with the demands for water. Much waste of labour might thus be avoided, and a considerable saving of money effected; but, under the circumstances, His Excellency the Governor in Council is unable to do more than to direct the Consulting Engineer to place himself in communication with the officers of the Company on the subject.

10. The question of establishing direct telegraphic communication between the Chief Engineer's house and the head-works at Soonkasala, referred to in paragraph 63, should be reported on in connection with the revised estimate returned with G. O. No. 2,424, dated 7th October 1870.

11. The Government regret to learn that the repairs to the apron and side walls of the head-sludge, sanctioned in G. O. No. 2,352, of the 29th September 1870, have not proved successful. It is hoped however that the measures now proposed to be taken by the Chief Engineer and detailed in paragraph 3 of the Consulting Engineer's report will effect the object in view.

12. Colonel Carpendale will bring under the consideration of the Company's Officers the remarks and suggestions in paragraphs 4, 14, 18, 20 to 23, 33, 34, 40 to 42, and 51.

13. Estimates for the repairs rendered necessary by the recent floods of the 6th and 7th August at Kurnool should be laid before Government with the least practicable delay.

14. The special attention of the Chief Engineer should be called to paragraphs 19 and 43 regarding the inferior description of work observable in the bridge at the 102nd mile, and the manner of fixing the cast-iron frames of sluice valves.

15. The Government will be prepared, upon the recommendation of the Consulting Engineer, to take into consideration the desirability of changing the site of the bridge referred to in paragraph 35.

(True Extract.)

(Signed) CHARLES A. ORR, Colonel, R.E.,
Secretary to Government.

No. 131. DOCKET No. 2,964, dated 7th December 1870.

Copy of the above forwarded for the information of the Government of India.

(True Extract.)

Colonel, R.E.,

Secretary to Government.

Exd. E. C. Shunker.

*Consulting Engineer's Office
Irrigation & Canal Company
Madras, 17th November 1870.*

*1870.
Mr. Colonel Carpendale, R.E.
Consulting Engineer for I.C.C.
The Secretary to Government
Department of Pub. Works.*

I have the honor to report that I inspected the Madras Irrigation and Canal Company's Main Canal from Soonkasala, Duddapah between the 4th and 31st of October, and to submit the following remarks on the condition of the works.

2. This work has apparently not sustained any injury this year - the water was flowing ten inches deep over it at the time of my visit.

3. In Government Order N. 2352-29 Sep. 1870 a sum of Rs. 2,920 was sanctioned for repairing the apron and side walls.

walls of the head sluice. - This amount ap-
-pears to have been partially expended, but
the work has not stood and will require re-
-newal. The apron had been partially washed
away, and the side or retaining walls of the
Canal below the head sluice had been under-
-mined. The Chief Engineer in a recent report
says, the injury sustained by the apron arises
from water passing below the head sluice
and under the concrete apron, by pressure
when the water in the river is high. It blows
up the apron, and he proposes to form a water-
-cushion by running a low wall across the
Canal below the head sluice, and between the
side walls, and to fill in the present irregulari-
-ties in the bed with concrete, and it is also
hoped that this will have the effect of prevent-
-ing the set of the current against the side re-
-taining walls which undermines them. -

The under sluice discharges silt well, but a
good deal still accumulates above the head sluice. -

4. The masonry works generally are in
good condition. The bed still
requires clearing of rock and
stones in some places, and the banks want
making

1st Section.
From 1st to 17th miles

making up and trimming, and the towpath
to be properly formed. The self acting sluice
or ealingah, sanctioned in Government Order
N^o 957-6 April 1870, has been completed
in a substantial manner, but the shutters
do not fit properly. - An additional irrigation
sluice sanctioned for the 9th mile in Govern-
-ment Order N^o 3468 of 28 Oct 69 has not been
begun. -

5. 6th mile - The two breaches, one at 5 miles
45 chains, the other at 5 miles 52 chains, caused
by the floods of August 6th, were being repaired
by banks of earth carefully laid and well ram-
-med, and the inner slopes will afterwards be
covered by a layer of puddle protected by
shingle. - Estimates are about to be submitted
to Government.

6. 10th mile - Two more large breaches at 9 miles
6 chains, and at 9 miles 53 chains, caused by the
same floods are being repaired in a similar
manner. - Estimates in hand. -

7. 18th mile - Large breach just below the Hindy
Aqueduct. The debris has been cleared away,
and the foundations for a new face wall dug
out. The progress of the work has been seriously
impeded

impeded by constant rain - The old wall which fell in when the embankment was washed away had been built merely as a facing to the embankment, and was without foundations of any kind - It will be replaced by a proper revetment wall of suitable section and with good foundations - when the breach occurred some apprehension was felt for the safety of the adjoining abutment of the Aqueduct from the rush of water - A water-cushion to break the force of the water, as it falls over the Aqueduct when the Canal is filling, will now be added.

A little below this breach on the same side of the Canal, a considerable portion of the face wall has slipped, most probably from the pressure of the moist bank behind it when it lost the counter pressure of the water in the Canal - It is being rebuilt of strong section with good foundations.

23rd mile - The Nadraugh Aqueduct sustained a little damage in the late flood & the apron below the flooring and the water-cushion which receives the Canal water as it passes over the work

2nd Section
from 18 to 32 mile

work in filling the Canal - In other respects this work has stood the severe test it has well - The works of this Section generally do not call for remark - The banks for the most part are in fair order.

10- 24th mile breach - Preparations are being made for repairing this breach caused by the floods of August 7th - The wall at this place, which has for some length been carried away, is in the form of the letter A, the centre part being filled with loose rubble almost rubbish - The banks are substantial enough, but as where they joined on each end of the wall, which is only two feet above water level, they dipped down, and would be still more lowered by the wear of traffic, I have no doubt that the accident occurred in the manner the Executive Engineer supposed, by the floods topping the bank and gradually washing it away.

25th mile - N^o 13 culingulah breached in the same storm - It is about to be repaired, and advantage is being taken of the circumstance to remodel the work, by lowering the crest 10 inches, the water for this depth in future being retained by plants removable in case of

of any excess depth of water occurring from
floods, or other causes. In order to make the
Canal generally safe in time of floods, the Chief
Engineer is about to propose remodeling in a
similar way all the calingulaks in that portion
of the Canal which receives drainage, and to
lengthen those calingulaks which are of in-
sufficient capacity, and he also purposes
building others at large tanks and drainage
basins, wherever there is a doubt as to the suf-
ficiency of the present escapes to pass floods
such as followed on the heavy rains of 6th and
7th August last at Turnool, all of which pro-
posals I will be prepared to support. -
28th mile breach August 7th. - This breach is
in a high wall across a deep
ravine somewhat in the ^{3rd & 4th Sections.}
form of the letter A, the centre purporting
to be filled with dry rubble packed, but it
appears to be rubbish. - The repair intended
to be made is a substantial permanent wall
with counterforts backed by a massive butt.
33rd mile. - The 2nd class bridge sanctioned
in Government Order N^o 3177-1st October 1869,
in lieu of the ruined Cultanpore tunnel, con-
sists of the usual three arches over the Canal
and

and two land arches in place of wing walls.
The piers and abutments are up, one arch kept,
and the others commenced, the amount remaining
available for expenditure on the 1st July last,
that is provided in the General Statement, was
Rupees 5593.... which I believe to be quite suf-
ficient. - There is no other new work in these Sec-
tions, and the only other important injury sus-
tained from late floods is at the Ullur Ague-
duct, where the water in the raga came down
in an impetuous torrent, bearing up compact
mud in deep trenches, and the water rose
so high as to flow over the parapet into the
Canal, then, as the flood drained off, the scour of
the pent up water in the Canal pouring through
a breach into the raga, undermined the face
wall of the aqueduct. - The Executive Engineer's
proposed arrangements for repairing the injury,
and for providing for the future safety of
the structure, seem judicious, and an estimate
of the cost is being prepared. - The area to be
irrigated under the 4th Erection is 14,007 acres in
the first range or sub division, for which
Rupees 20,929 was sanctioned in Government
Order N^o 2002-10th September 1860. - These works
are

are nearly completed.

12. In the second range there are 10,511 acres to be irrigated, for which Rupees 17,047 were sanctioned in Government Order N^o 2395-5 October 1870. The work is not yet begun.

13. No new works have been done in this Section since I last inspected it. The banks in some places are by no means in as good order as they should be. The inner slope of the left bank, on which the tow path is, requires clearing of bushes. The bank is inconveniently narrow in parts having worn away and become rounded by the weather.

14. The Terrapilly Aqueduct leaks a good deal more than last year, the water spouting out in every direction with only six inches water in the Canal, but it does not appear that the leakage will affect the stability of the work. The other masonry works are in good order. No provision has been made in the statement of 1st July, of value of work remaining to be done, for reforming the banks where necessary and levelling the tow path. The distribution works sanctioned in Government Order N^o 2256-19th September

September 1870 are being commenced. The land is being taken over, and the channels marked out. The area to be irrigated is 9,516 acres at an expenditure of Rupees 20,550 or Rupees 2-2-7 per acre.

15. The masonry works in this Section 6th Section which were incomplete last year are from 7 1/4 miles 57 chains to 93 - 25 - new mileage. 13 locks, all of which Lockinsala & Section so far as the masonry Ancient. is concerned, are complete with the exception of a little finishing. The lock gates are being swung, and the sluice rolling shutters are being fixed. The gates were made at Romanary workshops, and as would be expected, are much inferior to those made at Madras. The earthwork is mostly finished, and where the Canal passes through cotton soil or other soft material, the banks are in fair order, but their tops having been rounded to prevent them wearing into holes are inconveniently narrow, and where the cutting is in shale or flint the banks require a good deal of forming, levelling, and trimming. I examined the account of work remaining to be done and it

it appeared done that suitable provision has been made in the statement of 1st July. The Vellapancor Bridge at miles 87.12 has been completed in a substantial manner.

Just below Lock N^o 8, at mile 89.63, where a rajah breached the banks last year, a culvert with two vaults of 12' span and which was sanctioned in Government Order N^o ~~1226~~⁵¹⁸ 14 February 1870 has been built.

The distribution works sanctioned in Government Order N^o 1226 of 10th May 1870 are in as active progress as the weather will allow. Two fifths of the earthwork is done, and the masonry works are commenced. The rates allowed for masonry are lower than what were only found sufficient for the large works on the Main Canal, but the Executive Engineer hopes not to exceed them. The area to be irrigated is 27,970 acres at a cost of Rupees 71,400 or Rupees 2-0-6 per acre.

18. Loosoor Aicut. The Aicut and all head works, except a little to the Lock, have been completed of sound and substantial work; the floods of the past season are reported to have passed over the Aicut at a maximum depth of four feet and without doing any injury. The height of water seems low for a season

7th Section.
From miles 93.25 to 116
new.

season of unusual rain. Stone steps at each end of the Aicut for facility of passage across it are required. Silt in large quantities is deposited above the head sluices, and above the head Lock, and it is doubtful to me if the under-sluices, owing to the distance and the position in which they are placed, will even keep the head clear.

19. Work N^o 3. a second class bridge in the 94th mile, of which the embanking was up at my last inspection, has been completed. Work N^o 6 a culin-gulak in the 97th mile, which had not been begun, has also been completed. The Canal at this point receives a large supply of water from a rajah dallow of the escape of the surplus of which this culin-gulak was built. A breach in the lower or right bank of the Canal has occurred immediately below this culin-gulak. The cause is unknown, but it is supposed to have arisen from vermin burrowing in the dry bank. Work N^o 7 A. a second class bridge, of which the piers and abutments were up at last inspection, has been completed. Work N^o 8 a culvert in the 99th mile, which appeared done of rather small capacity, has sustained some injury, the silt trap has sunk, and the north wing wall has

has given way. — Work No 9 in 99th mile, a culminating, which had been partially built, has been replaced by a new one and a detached scouring sluice, sanctioned in Government Order No 1103-26 April 1870; the work has been completed. — Work No 11 in the 102nd mile, a bridge, which had been finished, has lost its parapet walls — they fell off owing to bad work and the peculiarity of the design, by which the parapets partially hung over the face-walls. — The masonry of all these structures is much inferior to the work in general of late years. —

All bridge approaches in this part of the Canal are very incomplete. —

In the 107th mile, the lower of the two aqueducts over the supply channels of the Mundial Saut has sustained some injury, there being several spouts through the arch up from below owing to the pressure of the water in the channel. —

In the 109th mile, Work No 22 a culvert of six vaults of 5 feet, has blown up; it will require to be rebuilt and the capacity of the culvert to be enlarged. — The rest of the masonry works in this part of the Canal are in good condition. —

23. As regards the earthwork, there is more grass and other vegetation on this portion than anywhere higher up; nevertheless, the slopes of banks and cuttings are much guttered and there was little appearance of any repairs being done. — The number of bankers maintained, namely one for three miles, is quite insufficient where the banks are not consolidated, much of the work that will now be necessary to make up the banks might have been saved by timely repair. — The money allowed in the 1st July statement gives an average of Rupees 665 per mile for completing cutting, forming banks, skinning, &c. — It is a tolerably large average, and I hope may prove enough, but it is not work that can be accurately estimated, or that should be given on contract. — The more carefully it is done and the closer departmental supervision, the more economical it will be in the end. — These remarks apply to the 7th Erection generally, though the upper part is by far the worst. — Work No 24 an eight foot culvert which had not been begun last year has been completed. — No 24, a 3rd class bridge in the 111th mile — the cutting is being put up. —

N^o 25, a culvert four vents of eight feet each, not begun at last inspection has been completed.

N^o 25. A 2nd class bridge, not begun at last inspection, has been completed, except in its parapets and roadway.

N^o 26. a culvert of two vents of eight feet in the 113rd mile, has been completed.

N^o 27. a 1st class bridge called Weepagintla in the 113rd mile, of which the piers and abutments were up at last inspection, has been completed.

The first instalment of irrigation under this Section is 12,000 acres and the distribution works are estimated to cost Rspees 44,660-0-0. The plans and estimates have been examined and are about being submitted to Government.

²⁵ 116th mile. The 8th Section and the Callis subdivision begun at this point. 8th Section. From mile 116 to 125 miles.

²⁶ In the 117th mile an additional bridge of the 2nd class, called the Lillala Bridge, and which was sanctioned in Government Order N^o 1712-18th July 1870, has been completed, except the parapet walls and the roadway.

²⁶ In the 118th mile, that is at 117.46 N^o 1 Lock is situated. Its masonry is all but finished, and the gates are being hung. The small calingulah in the left bank, for passing water round

round the lock, is nearly completed. The large calingulah with scouring sluice in the right bank, and which is to discharge all the water coming down the 7th Section Main Canal that may not be utilized or be required for the 8th Section, and which was sanctioned in Government Order N^o 2063-26th August 1870, has not been begun.

²⁷ At 119.15 is situated Lock N^o 2, which is almost complete, as is the calingulah in the left bank. The lock gates are being put up; the bridge over the Rail bay is not yet built.

²⁸ The masonry works are in good order; the banks are much better than in the 7th Section; the Canal has been taken out to full depth and width, and the banks made up since last inspection. They are in tolerably good condition. I compared the condition of the unfinished works with the 1st July statement of value of work remaining to be done, and am of opinion that sufficient funds have been provided except in one or two cases.

²⁹ From Callis to Chintavontah 119.35 miles to 131st mile, I was unable to inspect the line fully owing

owing to the extreme inclemency of the weather,
and the difficulty - I might say impossibility,
of riding along the banks. The following par-
ticulars I obtained from the executive engineers
with whom I talked over the condition of each
lock and the funds that would be necessary
to complete it.

Lock No. 3 - A little work remains to be done,
to the sills and coping and the gates and sluice -
valves are not yet fixed.

Lock No. 4 - There are from six to seven hun-
dred cubic yards of masonry still to do - gates
and valves to be fixed.

Lock No. 5 is far advanced towards completion.

Lock No. 6 - 125 mile - The masonry is finished,
the upper gates and valves fixed, and the calingulah
nearly completed.

Lock No. 7 - 125 mile - The masonry completed,
the upper gates and valves fixed.

Lock No. 8 - 126 mile - The masonry completed,
the upper and lower gates and valves fixed - the
calingulah far advanced.

Lock No. 9 - 128 mile - Masonry complete -
upper and lower gates and valves fixed - calingulah
begun.

Lock No. 10 - 129 mile - is quite complete, except

to have the lower gates. -
Lock No. 10 - 131 mile, is all but complete,
the upper and lower gates and all valves are
fixed.

30. Earthwork - The Canal as far as Chintacoon-
tah has been excavated to full depth and width,
but requires to be cleared out and the banks to be
made up.

31. From Chintacoontah to Napoli is 15 miles in
which the following masonry works are:

Lock No. 11	134 miles
Lock No. 12	138 miles
Lock No. 13	139 miles
Lock No. 14	142 miles
Lock No. 15	144 miles
Lock No. 16	145 miles

all these locks are pretty much in the same
condition as those higher up in the 8th section.
The masonry is complete except a little
finishing, and some gates and valves begun
to be put up.

32. Lock No. 13 - leaks badly from the water in
the upper reach, owing to interstices in the
masonry through which the water seeps.

33. The condition of the earthwork varies very
much, but on the whole, although much more
advanced towards completion, the banks are in a
worse

worse condition than they were a year ago.
Banks which have been recently repaired
are tolerably good to the right; those made some
time before, and which have been left unrepaired,
are terribly guttered, as are the slopes of cut-
tings and even solid berms. none of the banks are
consolidated, and riding on them is laborious and
difficult - a stream which passes under a culvert
in the 145th mile, and which has turned abruptly,
has injured the banks of the Canal and it will be
necessary to turn the course of the stream. -

34. I cannot take any exception to the sums pro-
vided in the Chief Engineer's statement for
completion of the works in the 7th and 8th Sections,
excepting Bridge No. 24 on which the work
remaining to be done on 1st July is valued at
Rupees 1333 and which at the time of inspection
more than three months later, seemed quite
insufficient - also work No. 25 another bridge,
had Rupees 2311 provided for it, and which
seemed to me much in excess of what is necessary. -

35. The Executive Engineer has suggested that the
bridge which was intended to be built over
Lock No. 16, and sanctioned in Government Order
No. 514, dated 22 February 1895, should be dispensed with.
This Lock is situated just above the Rajoli
Ancient

Ancient on the Kundar river. It does not
appear that there ever was a passage across the river
in the immediate neighbourhood and the construction of the Ancient
renders such a passage ^{more impracticable}. Moreover, there is a bridge
in connection with Lock No. 15, which is all
that the cart traffic of the locality requires -
and foot passengers could be accommodated
with a wood platform attached to the upper
gate of Lock No. 16. The bridge proposed to
be dispensed with might be built at Lock
No. 13 at 138th mile 3220 feet, where one is very
much wanted, the adjoining bridges being 4 1/2
miles apart. The villagers met me at Lock
No. 13 and were very earnest in their desire
for a crossing - I believe they would if ne-
cessary bear a portion of the expense, and
if the Chief Engineer proposes the alterations
I am prepared to recommend them. -

36. The Rajoli Ancient, the masonry of
which was completed
9th Section. -
From Rajoli Ancient
146th mile to 178th mile. -
sometime ago, is in
very good order - sluice
shutters have not yet been fixed except
temporary ones to the head sluices. The
undersluices will I am sure answer
well,

well and keep the head clear. The general condition of the masonry works corresponds to those already described. The bridges built some time ago are in good order. The locks are nearly finished. Some gates are up, and some sluice valves are fixed. The banks as far as Dimudiah a distance of 7 miles are in much better condition than on any other part of the Canal. The Canal has been excavated to full dimensions, but there is of course some silting up at the toe of the slopes. The banks are much more consolidated - less guttered - and in better shape than elsewhere, which I attribute to their having been formed with greater care in the first instance, and to the different system that has been maintained in regard to their periodical repair. It is true the weather had cleared up by the time I reached the 9th Section, and that the banks were drier, but their superior condition was chiefly owing to their having been repaired after such rains.

38 The Vaitalai Aqueduct is in good order but leaks somewhat.

Half
miles

39 Half a mile above Dhoor in the 161st mile the land is flooded at a mangoe slope where there is a difficulty in draining for want of sufficient fall on the opposite side of the Canal, and there are similar occurrences near the Dhoor Bungalow, and between there and Puchapias; the Executive and Deputy Chief Engineers propose cutting channels parallel to the Canal to drain the water under the neighbouring aqueducts, which will probably answer.

39 40 At the Prempias Culvert in the 166th mile one arch of which is intended to be used as a traffic way - the villagers complain sadly of the inconvenience they are put to in wet weather from its filling up with mud - I look upon it as a poor makeshift for a traffic way at any time, there not being room for a loaded bandy, and in wet weather it is quite impassable except for foot passengers, and for them it is unsuitable. An over bridge ought to be built where there is rising land in the vicinity, for there is no good crossing that is a bridge, in a distance of more than ten miles

40 Two breaches recently occurred in the banks between Dhoo and Peerhapias when there was only one foot of water in the Canal; the banks in contact with the water appear to melt away, and as the lower portion washes away, the upper part falls in, when a regular breach occurs in the bank and the water runs out.

41 Some three miles in length of the left bank at this part of the Canal is too soft for any traffic - The spoil has all been spread to the level of the tow paths which has a neat appearance, and compares favorably with other portions of the line, but the great breadth of flat surface necessarily exposed to the rains takes up much water. - The surface of the banks should be gently sloped outwards to throw off the rain, or the Canal will be seriously injured.

42 The 9th Section ends a little below Lock No. 8 at 17.8 miles - The condition of the Locks in this remaining portion is similar to those higher up - The masonry all complete - the gates and sluice shutters in course of fixing - The other masonry works are in good condition except that the syphon sluices fill up and require

require being cleaned out periodically. - The condition of the banks is very variable much in this lower portion is a good deal cut up.

43 The iron frames of sluice valves, all of which have been made in England, are said to be not in accordance with the drawings agreeably to which the locks have been built, and there is a difficulty in fixing them - sufficient space not having been left when the locks were built - it is now necessary to pull down part of the upper sluice chamber both in this section and in the eighth. I also notice that the iron frames are being fixed on a substantial wooden framework which I think is very judicious, but I doubt if it was the original intention; the cast iron frames look as if they were to be bolted to stone, and the legs for that purpose are being dispensed with, and it is proposed to cut them off - The Chief Engineer's attention is required to this matter.

Plans

144. Plans and Estimates for the ir-
-rigation of 17,000 acres
have been prepared and Distribution works.

are now before the Chief Engineer, and fur-
-ther projects are being investigated.

145. From the commencement of this Sec-
-tion to the Pennair, the 10th Section from 178 mile
Canal is very unfinished - that is about 2 miles above
the Pennair to 188 mile -

146. Tail Lock into Pennair. - The masonry is about
half done and the north west wall three quar-
-ters finished.

147. Adamapully Inicut. The portion of that
work which is founded on rock still requires
to be raised 2 feet 6 inches; of the part on walls
the main wall has to be raised similarly, and
the upper pitching is not yet done - but 1000
cubic feet of stone for it is ready quarried
and dressed. The work has not sustained any
damage from the freshets of the past season,
and as little cause is there for apprehension
of a scour along the face of the work, that
it is proposed to dispense with the protection
of a bank of rubble and groynes which I have
reported on in a separate communication. -
Head

Head sluices. - are complete and the shutters
are up, so is the masonry of the undersluices
except the upper flooring, and its shutters
are being fixed.

148. Head Lock. The masonry is almost fi-
-nished and the flood gates are up - the
lower gates not yet fixed and sluice valves
not received.

149. I do not think there is any reasonable doubt
about completing this work in time, and the
money should certainly suffice unless there
are greater charges in the Agents' office than
the Executive Engineer - expected for stones
and stone charges which could not be anti-
-cipates.

50. The Canal below Adamapully is eight miles
long of which the first and second miles are
incomplete; there being a good deal of rock
still to be taken out, and the slopes formed.
The last mile is not yet excavated - the rest
of the earthwork is for the most part com-
-plete - The masonry works incomplete
are the scouring sluice at the end of the Main
Canal

Canal, and the arch of the last culvert in the 178th mile remains to be turned. The other masonry works are complete except coping and a little finishing. —

⁵¹ The Puntal Wuntah Aqueduct appears in good order and not to have sustained any injury from the frosts of the past season. There was some apprehension that one abutment might be undermined from the scour and certain protective works at a cost of Rupees 867 — was sanctioned in Government Order No. 1624 dated 7th July 1870 which appears dangerous, and it is hoped avert all damage. —

The formation of the banks in this section has been well done and the Executive Engineer expects he will have a saving on this item. —

I passed up this section in a boat in the first week of October to inspect the Adamapully sluiceway, where there was but five feet of water in the Canal. The banks appeared quite sound, yet in the night of the 6th a breach occurred in the bank near the Puntal Wuntah Aqueduct and all the water ran out. The supposition was that vermin

had burrowed in the banks when dry. The breach was repaired and water readmitted before my arrival again at Adamapully at the end of the month, when on the night of the 29th a similar breach occurred close to where the old one had been. There is reason to believe that the Canal at this place traverses what was at some former period the bed of the Puntal Wuntah, and that quite to some depth below the ground surface is put in motion when the water in the Canal percolates to it, which entails the sinking of the banks. A careful examination into this matter will be made when repairing the present breach, and it may be found necessary to dig a trench along the toe of the bank to be filled with clay puddle. The banks near the breach seem well made and sound, and grass had grown over them satisfactorily. —

⁵² The Distribution works in this section, as at present intended, are calculated to irrigate 4,200 acres for which plans and estimates are now before the Chief Engineer. —

Water

53 Water having been passed down the Canal for a distance of 75 miles last season or to the end of the 5th Section, I had hoped on the present occasion to have found a marked improvement in that portion of the undertaking; but in consequence of the breaches caused by the floods of the 6th and 7th August the Canal was almost dry, and it presented a very unfinished appearance in comparison with what it is when tolerably full of water - No one part having ever been entirely completed - that is rocks and stones still require to be removed from the bed in some places; portions of the bed to be raised in others; slopes of cuttings to be trimmed and repaired; the tow path to be cleared of spoil and levelled; and the banks to be put in shape, cleared of bushes and trimmed.

General remarks
appearance of earthwork

54 In my letter as per margin I reported on the condition of the works generally, and the financial position of the Company, and intimated my intention of verifying the statements of the work remaining to be done; and the Government in order N^o 2555-27th October 1870 said they would await my further report on the subject.

N^o 77-3rd Oct 70.

subject - I accordingly had with me, through my inspection the Chief Engineer's detailed statement of the value of work remaining to be done on 1st July last, the total of which is embodied in my report quoted above; and I compared the conditions of the masonry works generally and the earthwork remaining to be done with that statement, making minute enquiry in many instances, and I feel satisfied that there should be no difficulty in completing the Main Canal and the works on it before the 30th June 1871, and that the funds shown in my former report as available will be found sufficient for the completion of the works, so far as the word completion means reparation of the Canal to full depth and width, putting the banks in section, and finishing all the masonry works - Locks - Bridges - Weirs &c on the Main Canal; for the engineers generally assured me that the statement referred to included all sums due & contributions for work done before the 1st July last, and I was unable to discover any discrepancy.

discrepancy of importance except that the Company's officers had estimated salaries from 1st July 1870 to 1st July 1871 as twelve months instead of thirteen, but as I had added 36528 Rupees under this head in my statement to Government the error is not of consequence. Although however, I quite expect the Canal to be finished to the extent mentioned above, I must not be understood to mean that the Main Canal with all distribution and other 'subsidiary' works will be in every respect 'complete and put in a thoroughly safe and 'perfect working condition.' For I am of opinion that a considerable time must elapse, and much periodical repair will be necessary, before the banks are consolidated and in a thoroughly serviceable condition, before in fact the tow path will be fit for use in the rainy season, the only time when the Canal will be navigable. - It is to be remembered also that consequent on the late breaches there will be no opportunity of testing the works in the upper portion of the Canal - the portion where danger and disastrous breaches are most to be apprehended before the 30 June 1871, and that the full depth of water will never have been

subject

been passed down. - also, that in all probability not one lock on the whole line will have been tried, and although the work of late years has been very good, locks are not work that could be passed as thoroughly safe and in perfect working condition until each one had been fully tested. - Neither can I speak at all confidently regarding the completion of the distribution works by the 30 June 1871, and I have no hesitation in saying that apart from the Contract, it is not for the interest of the Company - the Government or the country that they should be so completed. - The Company's Engineers will I am sure spare no exertions to get them completed in time, with the object of shewing that the Contract has been fulfilled, but the most sanguine cannot expect that even if completed they will be utilized for a long time to come, and before that time arrives the channels will be filled in, the banks broken down, and the masonry works considerably injured: in fact a large proportion of the amount that is going to be spent on distribution works will be simply lost. -

L

55. I have in a former part of this report noticed the present deteriorated condition of some of the earth.

Repairs.

work for want of timely repair, and having paid a good deal of attention to the subject, I have to record more prominently my belief that the annual repair of this Canal will be a very heavy item, for there are many adverse circumstances to conduce to it.

56. The Canal being dry for more than half the year is one, for there can be no doubt that vermin do burrow in the banks and make holes that sometimes lead to breaches. On this subject the Chief Engineer in his report for August 1870 says "In the 5th mile there is one place in two or three feet cutting where a hole 2' 6" in diameter and nearly round goes right through the bank just above the ground, and in three or four more places holes as large but not so well defined have been made; such banks might be come safe if under a constant head of water in the Canal, but cannot be depended upon with an inconstant supply." The banks and slopes of cuttings are much more guttered and cut up by rain when the Canal is empty than if it was full. No provision has been made for turfing

or resetting the slopes throughout and the cost would be so enormous no one would like to recommend it, and yet without such protection, at any rate to the slopes in soil where grass does not grow readily, the wash from waves in windy weather, or those caused by navigation, will be very destructive. The tow path too is unprotected and is easily cut up by rain; altogether, I do not think that the annual expenditure on ordinary earth-work repairs, exclusive of the cost of maintenance establishments and special repairs of breaches, can be estimated at less than 56,000 Rupees, or 300 Rupees a mile.

57. 58.

Revenue. The following statement exhibits the present prospects of revenue:—

Section.	Area to be irrigated according to Distribution schemes.	Area actually irrigated in 1870/71.	Estimated net revenue 1870/71.	Actual revenue collected and reported now for 1870/71.
1 st	1386	1128.22	Rs 78,666	Rs. 11,857.94
2 nd	1956			
3 rd	9,837			
4 th	25,318			
5 th	9,516½			
6 th	27,970			
7 th	12,000			
8 th	11,737			
9 th	17,000			
10 th	4,200			

58. In the Order as per margin passed on S.O. N^o 2376-
my Report of the injury sustained by the 1st Oct/70.-
Canal from the floods of the 6th and 7th August
last the Government expressed a hope that
the Company would now recognize the necessity
of strengthening all embankments of doubtful
stability, and that His Excellency in Council
would look to the Consulting Engineer to assure
himself that this is being done.

59. The first thing to be done in literally
obeying this order would be to raise all the
masonry walls - puddle core walls - puddle
lining &c. & put the Main Canal apparently
in a condition to carry 18 inches excess depth
of water, in order by such a test to discover
all the weak points in the banks and walls,
and I had a conversation with the Chief
Engineer on the subject after receiving the
order of Government quoted above. - Mr.
Latham's idea now is to lengthen certain ca-
lingulaks - build others - and lower the crests
of all in the upper part of the Canal to 6 $\frac{1}{2}$
feet above bed level - whereby the ordinary
depth of water in the rainy season being
kept

kept at that figure, and the calingulaks
or waste weirs being capable of discharg-
ing at 18" depth all excess water, estimated
at one inch per hour of rain fall for area
drained, the water could not rise in the Canal
more than eight feet above bed; and when the
full depth of eight feet of water is required
it will be obtained by shutters in the weirs.
In a recent report the Chief Engineer says
"I have no doubt that the Canal will never
be safe unless the calingulaks are sufficient
to pass off all rain water safely." - His satis-
faction to find that the Chief Engineer has
arrived at that opinion, for it is the first
step towards putting the Main Canal in a
safe condition. - I believe too that this
plan, whereby the water in the Canal will be
prevented from ever rising above eight
feet over bed, will be far preferable to
testing the Canal to a greater depth and incur-
ring the much larger expense of strengthen-
ing the walls and banks sufficiently to bear
the pressure of eighteen inches or two feet
excess depth of water. - The Chief Engineer is.

		Balance of Estimates sanctioned & to be sanctioned on the 1 st July 1870.	Mr. Latham's Estimate on the 1 st July for completion.	Difference.	
				Balance of Estimate.	Excess of Estimate.
Main Supply.					
60	Amment and Head works at Sorn Kasala	48039	4366	43673	71775
	Dug in Dynamically	28016	99791	7692	7692
	Main Canal 1 st Section	"	7692	111596	"
	" 2 nd "	123799	12203	57461	"
	" 3 rd "	72212	14751	78004	"
	" 4 th "	78131	127	12770	"
	" 5 th "	18213	5443	115566	"
	" 6 th "	169074	53508	1896	"
	" 7 th "	119134	117238	43077	"
	" 8 th "	105689	62612	214109	"
	" 9 th "	302671	88562	41628	"
	" 10 th "	114849	73221		
	Total	1179827	539514	719780	79467
Distribution.					
	Branch channels and sluices 1 st Section	2017	550	1467	135
	" 2 nd "	1385	1520	"	540
	" 3 rd "	1052	1592	"	4954
	" 4 th "	7004	11958	1956	"
	" 5 th "	24456	22500	"	6731
	" 6 th "	68503	75234	"	"
	" 7 th "	99000	99000	"	"
	" 8 th "	16500	16500	"	"
	" 9 th "	97245	82500	14745	"
	" 10 th "	12100	12100	"	"
	Turnool Town water supply	296	"	296	3
	Constructing a bund across the Canal in the 45 th mile 47 th Section	3	"	"	"
	Total	329561	323454	18467	12360
	Buildings.	24885		24885	"
	Cost for repairing breaches	73018	73018		
		97903	73018		
	Grand Total Rupees	1607291	935986	763132	91827
	Saving in estimates amount as appears from Mr. Latham's estimate of 1 st July for the completion of works			763132	671305
			Rupees	763132	763132

65. The Line was completed some time
Telegraph— since for the whole length
from Eoontāxala to Cud-
dapah through all Sections, and there is a
branch line from the Hindy Division office
at Turnool to the Chief Engineer's house, by
which he is in direct telegraphic commun-
-ication with each Executive Engineer. The
Line consists of a single wire. The branch
line to the Chief Engineer's house can be con-
-nected with the wire from Turnool to Cuddapah,
or with that from Turnool to Eoontāxala, but
it cannot be connected with both; at present
it is connected with the line to Cuddapah the
Chief Engineer considering it of greater import-
-ance that he should have immediate intima-
-tion of any accident below Turnool, and the
Eoontāxala line has a separate instrument
and battery in the Hindy office. This of so
much importance when an accident does oc-
-cur in the Main Canal that the head sluices
at Eoontāxala should be immediately closed.
I would recommend the Chief Engineer to have
a second line from his house to the Eoontāxala
line at the Hindy office in Turnool, by which
means

means he would be in direct telegraphic
communication with the head works.
66. In the course of my inspection of the
Canal I had many opportunities of seeing
how useful an adjunct the telegraph is, and
the importance of maintaining it. It is in-
-tended to be kept up permanently but it
has the appearance of being merely a tem-
-porary line as the poles which carry the
wire are very slight and would not stand in
a gale. The Chief Engineer however con-
-siders that they have answered expectation
and they are stated not to have been attacked
by white ants but not having been supplied
by the Forest Department at the time pro-
-mised some were felled when the sap was
flowing which have rotted and require to
be replaced. A special officer is now pro-
-ceeding down the line to see that all poles
are securely fixed in the ground and to complete
repairs rendered necessary by recent floods.
The instruments are for the most part worked
by the Engineers and the establishment of
signalers maintained is trifling. This sub-
-ject will be more fully reported on when
I reply to Government Order N^o 2424-7th October
1870

1870 disallowing the revised estimate for the
line of telegraph pending further explanation. —

Have the honor to be,
Sir,
Your most obedient servant,
J. Gurneale, Col. R. D.
Consulting Engineer for L. Company. —

Public Works 1870 Report
F. 93.
Effort for Cuddalore
N^o 4660

From
The Com Eng for M.C. Co.
to
The Secretary to Government
Pub Works Department.

Wrote 17th } Govt/70.
Recd: 18th }

Submits his Inspection
Report of the M.C. Co's
Main Canal from Sontialala
to Cuddalore between the
4th & 31st October 1870.

N^o 2963 & 2964 - 7th Dec 70

ck 129

A.C. 28 hours / 7000. 297
C. 26 hours / 7000. 285

Proceedings of the Madras Government.
Under date the 7th Dec 1870

From the Com Eng
Irrigation & C^o.

Read the following
(H. E. N^o 4660 of 17th Nov 1870)

In his letter of the
3rd October 1870 No. 77 recorded
with Proceedings No. 2555
dated 27th October 1870 the
Com Eng for the
Madras Irrigation and
Canal Company when
reporting upon the pre-
sent state and progress
and general financial
position of the Company
works brought to notice
that the sum of Rupees
9,35,985 estimated by the
Chief Engineer to be the
value

K.
A. S.
J. D.
W. H.

P. 151
value of work remaining
to be done on the 1st July 1870
was considerably below
the amount of the unex-
-pended balances of esti- + Rs 15,69,508
-mates and greatly short + .. 16,27,064
of the sum available
on that date.

Col. Carpendale
was of opinion that the
difference between the esti-
-mated value of work
remaining to be done
and the unexpended
balances of estimates
amounting to Rs 6,33,503,
might probably include
payments of various kinds
to be made for works
already executed and
with a view of satisfying
himself as to this and
of

of the general condition
and prospects of the
Company's works he
intimated his intention
of making a personal
examination of the Canal.

The letter recorded
at the head of these
Proceedings contains the
results of the Consulting
Engineer's inspection
extending over the period
between the 4th and 31st
October 1870.

On an examination
of the statement appended
to para 62 it is observed
that the difference allu-
-ded to above is greater
than was formerly esti-
-mated and amounts to

to Pro. 7. 63. 132. Colonel
Carpendale in most
cases is unable to afford
a satisfactory explanation
of the causes of this difference,
but he promises to in-
stitute further enquiries
of the Company's officers.
The result of these should
be laid before Government
with the least practicable
delay.

The Chief Engineer
is of opinion that no
difficulty should be
experienced in completing
the main Canal and the
works on it within the
stipulated time, and
that there are sufficient
funds at the disposal
of the Company for the

the purpose, but he does
not consider that "the
Canal with all distri-
-bution and other sub-
-sidiary works will
be in every respect
complete and put in a
thoroughly safe and
perfect working con-
-dition" by the date
in question, and he
points out that, not-
withstanding the care
with which the works
have been executed of
late years, a considerable
time must elapse,
and a heavy outlay
be incurred before the
embankments can be
consolidated and rendered
safe, the Locks tried
and

and the Canal generally
placed in a complete
and perfect working condition.

From this it would
appear that although
as far as yet can be seen
the monies at the disposal
of the Company will
suffice to complete the
Canal by the 1st of July
1871, so far as a work of
the kind can be said
to be completed before
it has been subjected
to trial and undergone
the test of a full supply
of water, it is evident
that the work will
not be in a fit state
for use till a much
larger sum than the
amount of the original
Capital

Capital of the Company
and of their Loan is
expended upon it. The
financial prospects of
the work would thus
appear to be far from
satisfactory, and they
do not appear more
promising when the
probable returns to be
derived, within any
reasonable period of
time are compared
with the heavy expen-
-diture that has been
incurred, or may still
be necessary. Every
possible exertion is,
it would appear, being
made to complete the
system of distribution
under the various
sections

sections of the Canal to
all the land capable
of irrigation from it, but
this is a work which
in the opinion of the
Comd Engineer and
his Review in that of
the Govt, can scarcely
with advantage be
hurried. Time is re-
quired to familiarize
the people with the
idea of introducing
so great a revolution
in their agricultural
operations as is involved
in the change from
dry to wet cultivation.
experience is necessary
to satisfy them of its
advantages and finally
the doubts they cannot
but

but entertain of the regu-
larity and permanency
of the supply of water
must be removed. Ex-
tension of irrigation is
therefore of necessity likely
to be very gradual while
the revenue derivable
from it for years to come,
will the Govt fear
probably be so in-
considerable as not to
cover the cost of the
working and mainte-
nance charges which,
owing to the special
circumstances of the
Canal, will almost
certainly be exceptionally
heavy.

If then the funds
remaining at the disposal
of

of the Company be not
much more than suf-
ficient as the Comd.
Engineer seems to think
to carry on their operations
till the beginning of
next July, the question
arises of how money is
to be provided for the
considerable and pro-
bably heavy expen-
diture that will have
to be continued not only
on the maintenance
and working of the
Canal, but on such
additions and strength-
ening operations as
there is no doubt will
be needed before it can
be placed in a secure
and

and thoroughly efficient state.
A copy of these Pro-
ceedings will accordingly
be forwarded to the Govt.
of India with a view to
such action being taken
by that Govt. in connec-
tion with the Budget
allotment of next year,
as the circumstances may
seem to demand.
His Excellency the
Governor in Council
cannot but agree with
the Comd. Engineer in
thinking that instead
of completing the works
of distribution at once
as if all the land in-
tended to be supplied
were likely to be taken
up for irrigation without
hesitation

hesitation or delay, it
would be preferable
so to carry them out as
to make them keep
pace with the demands
for water. Much waste
of labour might thus
be avoided, and a con-
siderable saving of
money effected, but
under the circumstances
His Excellency the Governor
in Council is unable
to do more than to direct
the Chief Engineer to
place himself in com-
munication with the
Officers of the Company
on the subject.

The question of estab-
lishing direct telegraphic
communication

22
communication between the
Chief Engineer's house and
the head works at Sontkanda
referred to in para 63, should
be reported on in connection
with the revised estimate
returned with G. O. No.
2424 dated 7th Oct 1870.

The Govt. regret to
learn that the repairs to
the apron and side walls
of the head sluice sanc-
tioned in G. O. No. 2352
of the 29th Sept 1870 have
not proved successful.
It is hoped however
that the measures
now proposed to be
taken by the Chief Engineer
and

and detailed in para 3
of the Comd Engineer's report
will effect the object in view.

Col. Carpendale
will bring under the
consideration of the Com.
-pany's Officers the remarks
and suggestions in paras
4, 14, 18, 20 to 23, 33, 34, 40,
to 42 and 51.

Estimates for the repairs
rendered necessary by the
recent floods of the 6th and
7th August at Kurnool
should be laid before
Govt. with the least
practicable delay.

The special atten-
-tion of the Chief Engineer
should

should be called to paras
19 and 43 regarding the
inferior description of work
observable in the bridge
at the 102nd mile, and the
manner of fixing the cast
iron frames of sluice valves.

The Govt. will be
prepared, upon the recom-
-mendation of the Comd.
Engineer, to take into
consideration the desira-
-bility of changing the site
of the bridge referred to
in para 35, and Col.
Carpendale will be
requested to state, in
submitting the proposal,
what proportion of the

Why should the villagers
pay at all? The Com. cost of the work the
hamp has created the
detruction - J.D.S. Y.A.P. villagers

villagers are willing to
contribute.

No 2964-1
H. E. No. dated

2 2
3
Lo. The Comptroller for the
M. D. & C. Co. ✓
Agent and Manager do - 1

Copy of the above
forwarded for the informa-
tion of the Govt. of India.

Desp'd 9/12/70

42
—
A.B.

Gobt. of {1870} Madras.

PUBLIC WORKS.

To the Consulting Engineer for
the Madras Irrigation
and Canal Company

To the Secretary to the
Govt of America

Dated

Recd.

End

G. O. ¹/₂ Dec 1870, No. 27312964

Nos. 129-130131

Main Journal. Paping index

In the Inspection Report, published by the Inspector, ^{one}~~of~~

the works of the Madras.

2. St. John's Main Canal

~~John~~ John Kasala

Handshake.

1884

Lawrence City of Mo. on

-Further Pro of 1402 2/8

February 17

853 of 22-3-71

ca-581-2924

1089 - 18-471

the inspection report of the Inspector

Superior to work with

Andrus & his main

Canal from Fort Kasala

Anddapha.

C-26-N70 A.25