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26th January 1870.*

No. 633. Read the following letter from the Acting Consulting Engineer for Irrigation and Canal Company, to the Secretary to Government, Public Works Department, dated Madras, 30th November 1869, No. 106:—

I HAVE the honour to report on the condition and state of progress of the works of the Madras Irrigation and Canal Company as found on a tour of inspection made between the 26th ultimo and the 18th instant.

2. In this tour the Company's Agent and Manager was good enough to accompany me, as did the Chief Engineer as far as Tallur in the 116th mile, where the Deputy Chief Engineer met us and accompanied us to Cuddapah.

3. I was unable to make a thorough examination of the present condition of the anicut, as the water was passing over it one foot deep; but the Executive Engineer informed me that no injury had been sustained since the breach which occurred in September 1868 had been repaired, and so far as I could judge from the appearance of the water there was no sign of failure. The undersluices do not appear to at all answer the purpose for which they were constructed, and the groyne which was thrown out to create a clear approach to the head sluice appears to have succeeded in a very limited degree, but it probably will become more effective hereafter, though at the expense of putting a good deal of silt into the canal which will have to be cleared out by hand. The low face walls to protect the sides of the canal immediately below the head sluice have partially given way, apparently from failure of the foundations, and it may be necessary to take them down and rebuild them. The Chief Engineer attributes the failure to the foundations not having been taken down to the level shown in the drawings.

4. Six feet of water was admitted at the head sluices a few days before I arrived, the breach which occurred in August last by the falling in of the Sultanpore tunnel, and which necessitated the water being shut off having been repaired, and the water had arrived as far as the 73rd mile where the first Regulating Lock is, and by which it was prevented from going lower down as it would have impeded the progress of the works in the sixth Section which are being rapidly pushed on. I travelled the most of this distance in a boat, riding, or walking along the banks at intervals where there was anything particular to inspect. The whole of the first Section is in very good order, the banks for the most part had been trimmed, and the top levelled, and the remainder was being done, the self-acting sluice in the 2nd mile, sanctioned in Government Order, No. 1,801, 2nd June 1869, had not been begun; the subsoil leakage and through the banks was insignificant. The chief masonry works are five bridges all recently erected, and nine calingulals all in good order. No. 5 Irrigating sluice was leaking a good deal from some defect in the masonry which the Executive Engineer ordered to be searched for and repaired. No. 10 Culvert, which is in the 9th mile, and which has been so designated from the commencement, though it is the only one of the kind now remaining, had been lately repaired. It is intended to answer the double purpose of a traffic passage and a drainage channel in wet weather; last

year the water accumulated so fast above the canal that it rose sixteen feet above the floor of the culvert, and the scour with this head was so great that the floor was broken up and the walls undermined. The repairs appear to have been substantially done; the wing walls of the upper end leak very much; the culvert itself does not leak much.

5. The Hindry Aqueduct continues to leak a good deal, but it is said to be trifling in comparison with what existed formerly. I am apprehensive that the constant percolation, which washes out the lime in the mortar, although in small quantities, must in the end do harm, and I would recommend as a measure of sound economy that the whole structure as high as water level should be lined with asphalt. The Company's Engineers will probably consider such a course a needless expense, but I would at any rate urge this improvement over the land arch that travellers may pass along the high road without being inconvenienced by the dropping water. The structure looks sound, and has cost to the present time more than 2,75,000 rupees.

6. The Store buildings are in fair condition but of very rough construction, and the timber in the roof of such inferior quality as to be quite unsuitable for the weight it has to bear; periodical repairs must be expected. The small repairs for which an estimate, amounting to Rupees 91, was recently sanctioned,* had been completed. There is a large quantity of worn-out tools and lumber of various kinds at the old stores, which it is intended to sell by auction, and there is a considerable quantity of iron, spades, and shovels, and other articles, new inasmuch as they have never been used, and for which there is no demand, that it would be advisable to dispose of if fair prices can be obtained.

7. 23rd mile Wall.—There is considerable subsoil leakage and spouts in the wall, but where a lining of puddle was added for a distance of a chain and a half, the work is water tight.

8. Rubble Walls Nos. 1 and 2 have each a somewhat bad leak, the water escaping appearing to be about three feet in section in each case.

9. The Kadrabagh Aqueduct continues to leak a good deal; the repairs and additions made to secure the foundations seem good. The original construction was very inferior and the mortar unsuitable; the lime is gradually getting separated and washed out, and the structure will always be a source of anxiety.

10. A bad slip had occurred just before I arrived, and a serious breach appeared imminent. It was caused by the water oozing through a stratum of sand just below the black cotton soil at the ground level. The bank is more than thirty feet high; the slip a hundred feet wide at base, and twenty feet at top. The Chief Engineer was present, and gave immediate orders for lowering the water in the canal

and making the necessary repairs, which I conclude were effectual, as, during our progress down the canal, we did not hear of any further damage. It occurred to me that it would have been very advantageous if above all parts of this canal where there was reason to apprehend breaches, the bridges had been provided with gates, similar to lock-gates, in order that, on the occurrence of a breach, the water might be shut off for three miles or so without having to drain the whole length.

11. This work, which fell in in August last from the pressure of the water in the Sultanpore Tunnel, causing a large breach, and necessitating the water being shut off at Soonkasala and the canal drained, had been closed, as a bridge is to be substituted for it. The bank was carried across its mouth, and the work has been well done, and does not show any sign of leakage.

12. The bridge sanctioned for Satanicottah village in Government Order, No. 1,800, dated 1st June 1869, has not been begun, but the site having been fixed and the design altered in accordance with that order, it, as well as a similar one at Muddigutla at 43-50 mile, will be put in hand as soon as the canal is laid dry.

13. The walls in these miles leak at bottom, and the escape of water is considerable, but it is through fissures in the rock, and does not appear likely to hurt the banks or the walls which are founded on rock.

14. The ferry-boat at Muddigutla is worn out, and the villagers complain of the inconvenience they are subjected to. I think a basket-boat should be provided for their use when there is water in the canal, until the sanctioned bridge has been erected.

15. In these sections all the walls which have been provided with a puddle-facing protected by a stone revetment answer well, and do not leak.

16. This section is for the most part in cutting and the masonry works are unimportant. The banks are all full height, have been put in section, and are in good order. The distribution channels laid out are forty-five miles in length; command 14,000 acres of land, and forty miles in length of these have been excavated.

17. Moochmurry Tunnel, eight feet wide, is loudly complained of by the villagers, and with good reason. It is at all times wet, and in the rainy season becomes quite impassable by reason of the silt which is deposited in it, and accumulates to a depth of more than three feet.

18. A three-foot culvert being insufficient to carry off the drainage in the last monsoon was partially blown up in June, and has been temporarily repaired. It is proposed to replace it by a six-foot culvert.

19. The Puggydial Tunnel at 54-75 mile is twelve feet wide, and has considerable traffic. It will probably always be wet, but it is quite sound, and there are no spouts of water in it.
55th mile.
20. The last seven miles are, as far as this point, the best looking in the canal; the work has been well-finished, the banks in good order, and full section, and the leakage very trifling.
61½ mile.
21. Teragopilly Bridge, sanctioned in Government Order, No. 916, 19th March 1869, consists of the usual three arches over the canal and two land arches of twenty five feet span, which are found to cost less than wing walls. The piers and abutments are completed, and the centering being put up. The work is very good, and the stone of a superior quality and well-adapted for coursed rubble; the rates are four-and-a-half rupees per cubic yard in the piers and abutments, and six-and-a-half rupees in the arch: all contract work.
Fifth Section.
61st to 72nd mile.
22. Teragopilly Aqueduct was built last year and is in good order, but leaks somewhat by spouts through the wing walls and abutments. It is hoped that the leaks will be eventually stopped up by silt deposited, but I do not share in the expectation.
23. Jootoor Bridge, 2nd class, sanctioned in Government Order, No. 199, 21st January 1869, is similar to the one at Teragopilly; the arches are all turned, the last having been keyed on the 2nd instant. The work is all very good.
67th mile 10 chains.
24. In this section, the fifth, the banks have not been revetted, as it was thought they would stand without this precaution; experience shows that they fall in a good deal from the wash at the water line, and it will be necessary to revet them throughout before the canal is brought into general use. This can be done I understood with large solid *kunkur* which answers admirably, and costs about one-and-a-quarter rupee a cubic yard.
General remarks.
25. Pamulpaud Bridge, three arches, sanctioned in Government Order, No. 1,557, 2nd May 1868, was completed three months ago. The work is very good.
69th mile 20 chains.
26. Lockinsula.—This is the terminal point of the water at present; seventy-four-and-a-half miles from Soonkasala by the new measurement, the water is stopped by Lock No. 1, which is a regulating lock for the sixth Section; the surplus water at present escaping by a natural calingulah a little higher up and drains into the Caulee.
Sixth Section.
73rd to 91st mile.
27. This lock is filled by means of a revolving shutter on the principle of a common tap. It was worked with difficulty owing I believe to its being out of use. It seemed a very efficient contrivance for rapidly filling or emptying a lock. The

water issued with such velocity as to pass by the inlets for filling the lock, and practically filled it by passing into the lock by the openings at the lower end of the tunnel intended for emptying the lock.

28. I understood that this was the only valve of the kind, and that the one to be adopted for general use on the canal is a rolling shutter which is raised vertically; friction being reduced by means of rollers moving on trains, but I have not yet seen one, and I cannot offer an opinion about it.

29. The canal from this point for a distance of six miles is on a contour line, the excavation being only one foot, and the canal running between double banks.

30. Lock No. 2, two chambers with a double drop of 10 feet 10 inches; one complete the other about three-quarters done. Locks No. 2A and No. 3 are each about nine-tenths complete. All the work lately done, and now being done in these locks, is superior, and contrasts most favourably with the old work. The rates are three-and-a-quarter rupees per cubic yard.
6 miles 2 chains.

No. 4 Lock has two drops of 10 feet 10 inches, and is a very heavy piece of work; the foundations being of great depth to reach rock. It is about three-fourths done; the rates Rupees 4 a cubic yard for rubble, and 8 to 10 for cut-stone. There are two arches of twelve feet span under the upper reach for drainage, and to be used as a traffic way.

Lock No. 5, ten-foot drop, is all but completed.

Lock No. 6, ten-foot drop, will be finished this month.

Lock No. 7, a double drop of nine feet, is nearly complete.

31. 83-75 mile old.—Culvert No. 6 close to Vellapanoor is built as an aqueduct, seven arches of twelve feet, the structure has been completed, and the work is very good.
86th mile, new measurement.

32. All the earthwork in this, the sixth Section, is backward, the labour and attention having been concentrated on the masonry works on which the progress had been very great; the earthwork is not heavy, and will now be rapidly proceeded with.
Earthwork.

33. A centre arch forty feet span and two land arches of twenty feet. The piers and abutments are completed, and the centering being put up.
Vellapanoor Bridge.

34. The following works: Locks Nos. 8 to 12 are completed as regards the masonry work or very nearly so.

Lock No. 8.—A double drop of eight feet; close by a vagoo has breached the banks, and it is proposed to build a culvert which appears very necessary.

Lock No. 9.—A double drop of eight feet.

Lock No. 9A.—One drop of eight feet with three arches over a vagoo.

Lock No. 10.—A double drop of ten feet.

Lock No. 11.—One drop of ten feet with a bridge over the tail bay.

Lock No. 12.—One drop of ten feet nine inches. Between this point and Jootoor the bye-wash of the river has breached the banks which will require to be revetted.

35. *Jootoor Anicut.*—The remains of the old Jootoor Anicut, which was thrown over by a fresh in July last, have for the most part been cleared away, and the foundations are being dug out. The design for a new anicut has been prepared, and will be submitted at an early date. I understood that it provides a foundation two feet below the water cushion of the old work. There was too much water in the Causee for me to see the floor of the cushion, but if it is at all damaged, as I think it must be, it should be taken up and be replaced by a much more substantial flooring of deep stone pitching, and I would recommend that the foundations of the anicut be carried through all the strata of shale, until solid stone is reached, although only two feet *extra* foundation is provided in the plan.

36. The quantity of water to be received at the head of the seventh Section is 100,000 cubic yards an hour, of which it was intended that only 35,000 should be used for irrigation in the upper portion of the section, as the remaining quantity would be necessary for maintaining a depth of five feet in the lower portion of the section for navigation, and it had been proposed that 46,000 cubic yards should pass into the eighth Section as its supply, which would necessitate the construction of surplus sluices for the discharge of 54,000 cubic yards in the seventh Section. The Chief Engineer now objects to passing any water for irrigation into the eighth Section as he considers that a greater quantity than the whole of what is available can be utilized for irrigation in the seventh Section, and more economically than by passing it on to the eighth. I am not aware of any objection to this course, and if the Government have none the greater part of the 65,000 cubic yards an hour remaining as above will be used for irrigation in part of what is now called the sub-division, that is from the 1st lock in the eighth Section or at the 115th mile, for a length of six miles or to the 121st mile. Then sufficient water for navigation only, that is lockage, evaporation, and leakage, would pass into the lower part of the eighth Section in which there would not be any works for surplus discharge, and one calingulah and scouring sluice above the lock at the 115th mile capable of passing 100,000 cubic yards an hour would suffice.

92nd mile,

37. Work No. 2, a second-class bridge, two arches of thirty feet, the centering has just been put up.

Work No. 3.—Calingulah, three vents of five feet, complete.

93rd mile.

Work No. 5.—Calingulah two vents of five feet.

94th mile.

Work No. 7.—Culvert two five-feet vents.

Work No. 7A.—Is a second-class bridge, two arches of thirty feet span. The piers and abutments are up. Little work is going on; labour is scarce, and no carts obtainable at present.

Work No. 8.—Is a culvert, two vents of five feet, which from its present appearance I would consider much too small.

96th mile.

40. Work No. 9.—Calingulah said to be half complete, but the sluices have not got above ground level.

97th mile.

41. Work No. 9 A.—Second-class bridge, two arches of thirty feet.

42. Work No. 10.—Culvert, two vents of twenty feet, sanctioned originally, but has been converted into four vents of ten feet, and will be built as an aqueduct. The foundations of the piers are reported complete, but all is covered up at present.

98th mile.

Earthwork.

43. All this portion of the canal requires to be cleared out, and the banks made up, and put in section.

Work No. 10 A is a culvert, two vents of five feet.

99th mile.

44. Work No. 11.—A three-foot culvert completed.

Work No. 11A.—A third-class bridge, two arches of thirty feet span, is complete except the approaches.

Work No. 12.—A three-foot culvert.

Works Nos. 13 and 14 were intended to be culverts each with one vent of eight feet; they have been abandoned and their capacity included in.

Work No. 15.—Which originally was intended to be a culvert with one vent of ten feet, but has been constructed with six vents of five feet.

102nd mile.

45. Work No. 17.—Is a syphon sluice, six vents of five feet, completed, and has absorbed in it No. 18, which was intended to provide one vent of ten feet.

Work No. 19.—Called an aqueduct, is built as a culvert, five vents of ten feet.

104th mile.

46. Work No. 19A.—Is a second-class bridge, and is complete except the approaches. It has two arches of thirty feet, and two land arches of twenty.

Work No. 20.—Is an aqueduct over the Palar, and consists of twenty-two arches of ten feet.

105th mile.

47. Work No. 21.—A culvert, three vents of eight feet, one of which will be used as a passage for cattle.

106th mile.

48. Work No. 22.—Culvert, six vents of five feet, completed.

Work No. 23.—Is a skew bridge at Iyaloor; two arches of twenty-five feet span. It is just being completed, and is a sound substantial work, and well-finished.

107th mile.

49. Work No. 24.—An eight feet culvert, not yet begun.

Work No. 24A.—A second-class bridge, not begun.

Work No. 25.—A culvert, four vents of eight feet, not begun.

110th mile.

50. Work No. 25A—Second-class bridge, not begun.

111th mile.

51. Work No. 26—A culvert, two vents of eight feet, is up to springing.

Work No. 27—Is a second-class bridge at Depuguntla; two arches of thirty feet; the pier and abutments are built, and centering up.

111.7 mile.

52. Up to this point the canal is full depth, the banks where made of black cotton soil are a good deal cut up, at other places where the soil is gravelly they stand well. It will be necessary to turf the greater part of these banks, and torevet the inner slopes where the wash of the water will come.

114th mile.

53. A second-class bridge; the foundations are dug out.

Earthwork.

54. From the 111th to the end of the 115th mile the canal is now being taken out to full width, and the banks are being made up.

Eighth Section. 115th to 143rd mile.

55. From the 115th to the 128th and $\frac{1}{4}$ mile there are eleven locks in various states of progress. In Nos. 1, 4, and 5 the excavations are completed, or the foundations being taken out; No. 9 is about one-third built; Nos. 2, 6, 7, and 10 are each from about three-fourths to seven-eighths done; and Nos. 3, 8, and 10A are almost complete as respects the masonry work.

Earthwork.

56. From 117.24 mile to 121st the banks are being formed; the excavation which will be very slight is not yet done, thence to 122.25 the bed is being dug out and is well-advanced, and is in the same condition as far as 128.25. The bed in each reach begins with a cutting five to seven feet deep, and ends two feet above ground level. At two of the locks permanent huts for lock lascars have been built, and charged to contingencies, being used as offices by the Masonry Inspectors at present. The masonry work in this portion of the canal is being done by daily labour and is very good, neat, and substantial, the whole is expected to be completed by end of February 1870.

131.25 mile.

57. Lock No. 11—One drop of 12.6 and with a bridge is almost finished; the stone used is superior; the work very good; done entirely by daily labour, and the cost all over including centering averages Rupees 3-4-0 a cubic yard.

133rd mile.

58. A second-class bridge, one arch of forty feet and two of twenty; pier and abutments are built.

135.5 mile.

59. Lock No. 12—One drop, thirteen feet ten inches; the work is about half done.

136th mile.

60. Lock No. 13—Drop, twelve feet six inches; work three-quarters done.

139th mile.

61. The earthwork from Chintacoontah to this, or for a distance of ten miles, is far advanced, and will be completed in a few weeks. This is decidedly the best time of the year for work of this kind, and it is hoped the banks will be a good deal consolidated before the next heavy rains; but as there is no provision for revetting or turfing, I fear that the repairs which will be necessary at the close of the next south-west monsoon will be serious.

140th mile.

62. Lock No. 14—With a second-class bridge, drop twelve feet six inches; will be completed in three weeks.

142nd mile.

63. Lock No. 15—Drop twelve feet six inches; work less than half done.

Aqueduct, three flat arches of five feet each, is complete, except the plastering.

142.10 mile.

64. The bridge which has been sanctioned is not yet commenced; stone has been collected.

143.2 mile.

65. A culvert, one vent of five feet; walls have reached the ground level.

143.17 mile.

66. Lock No. 16—Drop thirteen feet; the foundations are being got out.

Here the eighth Section ends in which the earthwork was being fast completed, and the banks well and neatly formed; the rates for the most part ten cubic yards per rupee, but in some cases eight.

Ninth Section.

From 144th to 178th mile.

67. This work was completed last April except the coping for one-half the length. It stood the freshes in the last south-west monsoon well, no stones having been displaced, except in the bed of the river below the work where a good deal of stone was broken up, including some large slabs, which the water has piled up in front of the anicut, forming a natural water cushion, that will be beneficial. The river is reported to have passed over the anicut nearly eight feet deep in the last monsoon:

144.67 mile.

68. A culvert, two spans of twelve feet.

145.25 mile.

69. A second-class bridge completed nine months ago.

145.77 mile.

70. A culvert, five vents of five feet.

71. Vaikalair Aqueduct, ten arches of thirty feet, was completed in June last; appears to be a substantial work but the stone is ill-shaped; the mortar joints, and the mortar itself very coarse, giving the whole a rough appearance; considerable leakage must be expected.

72. From Rajoly for six miles the earthwork was all completed about two years ago, with the exception of a small portion at the head, and some trimming and filling of gaps; the banks have had the rains of two monsoons and have stood well.

Earthwork.

150.12 mile.

A five-foot culvert.

150.30 mile.

A second-class bridge.

150.74 mile.

73. An aqueduct, five arches of twelve feet, completed.

151.15 mile.

74. A culvert, two vents of five feet.

152.66 mile.

75. A second-class bridge.

153.35 mile.

76. A culvert, three vents of twelve feet, the arches are being turned.

154.25 mile.

77. A culvert, three vents of nine feet, just completed.

154.64 mile.

78. A second-class bridge commenced.

155.15 mile.

79. A culvert, three vents of nine feet, just completed.

157.54 mile.

80. Dhoor Aqueduct, two arches of twenty feet, crosses the drainage of the

Dhoor Tank, and is intended as a second-class communication also. It is too low for loaded bandies, but will suit for cattle, ploughs, and manure carts. The villagers complain a good deal of its insufficiency, but as there is a second-class bridge two miles higher up, and a first-class one for the public road to Cuddapah one-and-a-quarter mile lower down, they have as much facility for crossing as there is in any other part of the canal.

158.69 mile.

81. First-class Bridge.—The abutments and wing walls are built, and the centering is being put up.

82. From Eddemmuddikah to Dhoor, or for the last nine miles, excepting short patches near some of the masonry works, the earthwork was all done nearly two years ago. The banks stand well, but require a little making up and trimming.

159.60 mile.

83. A twelve-foot culvert.

159.66 mile.

84. Surplus Weir No. 1, seventy-two feet long, to discharge 15,000 cubic yards an hour with a six-inch head, is more than three-quarters finished.

163rd mile.

85. An aqueduct, three spans of twelve feet, intended also as a traffic passage for which it is quite unfit; 163rd mile is the position of what had been intended as surplus Weir No. 2 to discharge 15,000 cubic yards. The Executive Engineer now proposes that it should be given up, Nos. 1 and 3 being ample, and so it would appear as the quantity of water to enter this part of the section, except at the head-slucice where it can be shut off, is insignificant.

164th mile.

86. A culvert, four vents of nine feet, over the outlet of the Chintacoontah Tank is completed.

166.20 mile.

87. Moosapillay Aqueduct, eight spans of fifteen feet, was intended also as a traffic way for which it is quite unfit, the width of water way is thirty feet, and the work has just been completed.

166.65 mile.

88. A culvert, two vents of nine feet.

167.21 mile.

89. Peechapad Aqueduct, seven arches of nine feet, lately completed, can be used as a traffic way except for high loads; the masonry is sound and good. The Executive Engineer purposes proposing the erection of a bridge at 162.50 mile, and another at 165.5, both of which appear very necessary.

90. From Dhoor to Peechapad, a distance of eight-and-a-quarter miles, the excavation of bed and formation of banks was commenced at the close of the last hot season, and is all well-advanced, excepting patches of a few chains in length; the canal is full width and depth, and the banks formed. The rates average eight cubic yards per rupee, and the work is well done. The Executive Engineer having been particular in examining them during formation, and the soil is for the most part suitable.

Earthwork.

91. Site of No. 3 surplus weir which is 150 feet long and is more than three-quarters built. It will have a double overfall and water cushion, and another

167.24 mile.

fall a little lower down the vagoo to lower the water to bed of stream.

92. Neither this work nor No. 1 surplus weir mentioned above had been sanctioned; when sanction was asked some months ago the Consulting Engineer took exception to the position of the first as being needlessly close to the head of the section, and recommended a re-consideration of all the designs with the object of having more compact, less lengthy works constructed; but the work had been actually commenced and well-advanced beforehand of which no mention was made. It is now too late to alter either the designs or the sites except at great loss. The works are being built on the principle that has been followed throughout the canal of self-acting weirs discharging with a small head, and there is nothing objectionable in the sites, but it is to be regretted that the Company's Engineers will continue to execute works without approval, in hopes that, when the formality of seeking sanction has been gone through, no objection will be raised.

93. From the 169th to the 178th mile, or the end of the Dhoor Division, there are eight locks in various states of progress. In Nos. 7 and 8 the foundations are being taken out; Nos. 1, 2, 5, and 6 are from three-fourths to nine-tenths built, and Nos. 3 and 4 are all but complete as respects the masonry work. In some of these locks the mortar joints are very coarse, they will all require pointing and with special care where there is any scour.

170.50 mile.

94. A syphon sluice for the drainage channel of the Midekoor Tank is complete.

173rd mile.

95. A syphon sluice.—Foundations are being taken out, all in rock.

173½ mile.

96. Another syphon sluice has just been commenced.

97. From the 169th mile for about five miles the cutting for canal and formation of banks is about half done; two miles more towards Adimapully is only begun, and two miles have not been commenced.

Earthwork.

178th mile.

98. The tail lock—Dhoor Division has not yet been commenced.

99. The foundations have been laid for a length of 400 feet from the right bank of the Pennair, twelve feet wide, and two feet deep, on rock; the whole length to be built in this way is 540 feet. The total length of the anicut will be 2,240 feet. Of that portion which was intended to be on wells a length of 500 feet is being built on hard clay, the wells having been dispensed with as clay was found near the surface. For the portion to be built on wells the rear row and the middle row of wells have been sunk all across; the middle row are reported to be four to six feet deep, and the lower row eleven feet deep. The front row of wells has not yet been sunk. Work for the season is scarcely begun as the freshes may only now be said to be over, and a viaduct on the tramway which was carried away in the rains has not yet been repaired as the foundations could not be got at. A good deal of stone has been collected, much of it of a very superior quality, and a hundred waggons are in readiness for use on the tramways.

Tenth Section.
Adimappully to Cuddapah.
1st to 8th mile.

4½ mile.

100. Second mile, an aqueduct the Punkalwunkah, seven arches of thirty feet, the piers have been erected, and the centering about to be put up.

5.5 mile.

101. A drainage culvert, ten feet wide, not yet begun.

5½ miles.

102. Syphon culvert, two vents of ten feet; foundations dug out.

5.74 mile.

103. Dooganapully Bridge, second-class, complete except the approaches.

7.50 mile.

104. An aqueduct, four spans of ten feet, has been completed.

105. A ten-foot culvert not begun.

106. The first two miles in this section have only just been begun. For a further length of three miles it is complete, and in some places the banks and even the

Earthwork.

cuttings gutter a good deal; the next two miles are in various states of progress, and ground has not yet been broken in the 8th mile, which ends the tenth Section.

107 Those received from England are on the same principle as what were made in this country and are in use in the upper sections, but the thread of the screw being square they work much better.

Canal sluice fittings.

108. The supply is very late; I only saw one, namely, that described for the regulating lock at Lockinsula.

Lock shutters or valves.

109. Appear to be very backward; none have been put up, except in the one lock, and I did not see or hear of any more having arrived on the canal.

Lock Gates.

one lock, and I did not see or hear of any more having arrived on the canal.

No. 634.

ORDER THEREON, 26th January 1870, No. 330.

IRRIGATION, No. 26.

In this letter the Acting Consulting Engineer for the Madras Irrigation and Canal Company reports the result of

his inspection of the works of the Company during November 1869.

2. The Government observe that the breach which occurred in August last by the failure of the Sultanpore tunnel has been repaired, and that the water, which had been shut off in consequence of the accident, had, at the date of Colonel Carpendale's inspection, arrived up to the first regulating lock at the 73rd mile.

3. Looking to the injury to which the Hindry Aqueduct is exposed by leakage, it is of importance that all possible precautions should be adopted to make the work water-tight, and Colonel Carpendale will accordingly bring under the consideration of the Company's Chief Engineer the suggestion in paragraph 5. He will also communicate those in paragraphs 6, 10, 14, 24 and 35.

4. His Excellency the Governor in Council sees no objection to the arrangements proposed in paragraph 36.

5. The Government cannot too strongly deprecate the practice to which Colonel Carpendale adverts in paragraph 92, under which the application for sanction to plans and estimates becomes a proceeding so utterly formal as to render the control which the Consulting Engineer is expected to exercise almost nugatory.

(True Extract.)

Colonel, R.E.,
Secretary to Government.

To the Consulting Engineer for the Irrigation and Canal Company.
,, Manager for do. do.

Ed. J. Wright.

(71)

Consulting Engineers Office
Irrigation Canal Company
Madras, 30th November 69.

N^o 106.

To, Colonel, I. Carpendale, R.E.
Alone for S. Co.

The Secretary to Government
Department of Pub. Works.

1. I have the honor to report on the condition and state of progress of the works of the Madras Irrigation and Canal Company as found on a tour of inspection made between the 26th ultimo and the 18th instant.

2. In this tour the Company's Agent and Manager was good enough to accompany me, as did the Chief Engineer as far as Vallur in the 116th mile, where the Deputy Chief Engineer met us and accompanied us to Cuddapah.

3. I was unable to make a thorough examination of the present condition of the Anicut as the water was passing over it one foot deep but the Executive Engineer informs me

me that no injury had been sustained since the breach which occurred in September 1868 had been repaired, and so far as I could judge from the appearance of the water there was no sign of failure - The undersluices do not appear at all answer the purpose for which they were constructed, and the groynes which was thrown out to create a clear approach to the head sluice appears to have succeeded in a very limited degree, but it probably will become more effective hereafter, though at the expense of putting a good deal of silt into the Canal which will have to be cleared out by hand. - The low face walls to protect the sides of the Canal immediately below the head sluice have partially given way, apparently from failure of the foundations, and it may be necessary to take them down and rebuild them. - The Chief Engineer attributes the failures to the foundations not having been taken down to the level shown in the drawings. -

4th Six feet of water was admitted at the head sluices a few days before it arrived, the breach which occurred in August last by the falling in of the Sultanpore Tunnel, and

1st Section Main Canal.
0 to 1 1/2 miles.

and which necessitates the water being shut off having been repaired, and the water had arrived as far as the 73rd mile where the first Regulating Lock is, and by which it was prevented from going lower down as it would have impeded the progress of the works in the 6th Section which are being rapidly pushed on. - I travelled the most of this distance in a boat riding, or walking along the banks at intervals where there was anything particular to inspect. The whole of the 1st Section is in very good order, the banks for the most part had been trimmed, and the top levelled, and the remainder was being done, the selfacting sluice in the 2nd mile sanctioned in Government Order No. 1801-2nd June 1869 had not been begun - the subsoil leakage and through the banks was insignificant. - The Chief Masonry works are 5 Bridges all recently erected, and 9 Culverts all in good order. - No. 5 Selfacting sluice was leaking a good deal from some defect in the Masonry which the Executive Engineer ordered to be searched for and repaired. - No. 10 Culvert which is in the 9th mile, and which has been so designated from the commencement, though it is the only one of the kind now remaining, had

had been lately repaired. It is intended to answer the double purpose of a traffic passage and a drainage channel in wet weather. Last year the water accumulated so fast above the Canal that it rose 16 feet above the floor of the Culvert and the room with this head was so great that the floor was broken up and the walls undermined. The repairs appear to have been substantially done - the wing walls of the upper end leak very much - the Culvert itself does not leak much.

5. The Hindy Aguedinet continues to leak a good deal but it is said to be trifling in comparison with 18th mile. what existed formerly. I am apprehensive that the constant percolation, which washes out the lime in the mortar, although in small quantities, must in the end do harm, and I would recommend as a measure of economy that the whole structure as high as water level should be lined with asphalt. The Company's Engineers will probably consider such a course a needless expense but I would at any rate urge this improvement over the land which that travellers may pass along the high road without being inconvenienced by the dripping water. The structure looks square and has cost to the present time more than 275000 Rupees

G.O. 11-3579-8
Nov/69.

Rupees. 3 19
6. The Store buildings are in fair condition but of very rough Hindry stores. construction, and the timber in the roof of such inferior quality as to be quite unsuitable for the weight it has to bear - periodical repairs must be repeated. The small repairs for which an estimate amounting to Rupees 91 was recently sanctioned had been completed. There is a large quantity of worn out tools and lumber of various kinds at the old stores, which it is intended to sell by auction, and there is a considerable quantity of iron, spades, and shovels, and other articles new in so much as they have never been used, and for which there is no demand, that it would be advisable to dispose of if fair prices can be obtained.

7. 23rd mile wall. There is considerable subsoil leakage and 2nd Section 18 to 32nd mile. spouts in the wall, 3rd Section 33rd to 43rd mile. but where a lining of puddle was added for a distance of a chain and a half the work is watertight.

8. Puddle walls Nos 1 and 2 have each a 25th mile. somewhat bad leak, the water seeping appearing to be about three feet in Section in each case.

9. The Madraugh Aqueduct continues to be a good deal - the repairs and additions made to secure the foundations seem good - the original construction was very inferior and the mortar inevitable - the lime is gradually getting separated and washed out, and the structure will always be a source of anxiety.

10. A bad slip has occurred just before I arrived and a serious breach appeared imminent. It was caused by the 31st mile. water running through a stratum of sand just below the black cotton soil at the ground level. The bank is more than thirty feet high - the slip a hundred feet wide at base, and twenty feet at top - The Chief Engineer was present and gave immediate orders for lowering the water in the Canal and making the necessary repairs, which I conclude were effectual as during our progress down the Canal we did not hear of any further damage - It occurred to me that it would have been very advantageous if above all parts of this Canal where there was reason to apprehend breaches, the bridges had been provided with gates, similar to lock gates, in order that on the occurrence of a breach the water might be shut off for three miles or so without having to drain the whole length.

11. This work which fell in in August 21st last from the pressure of the water in the Sultanpore tunnel.

Canal, causing a large breach, and necessitating the water being shut off at Eonticavala and the Canal drained, had been closed, as a bridge is to be substituted for it. The bank was carried across its mouth, and the work has been well done and does not show any sign of leakage.

12. The Bridge sanctioned for Sutaniothak Village in Government Order No. 1800 dated 1st June 1869.

39th mile. has not been begun, but the site having been fixed and the design altered in accordance with that order, it as well as a similar one at Muddigutla at 43-50 mile, will be put in hand as soon as the Canal is laid dry.

13. The walls in these miles leak at bottom, and the escape of 40th & 41st miles. water is considerable but it is through fissures in the rock, and does not appear likely to hurt the banks or the walls which are founded on rock.

14. The ferry boat at Muddigutla is 43rd mile. worn out and the villagers complain of the inconvenience since they are subjected to - I think a basket boat

boat should be provided for their use when there is water in the Canal until the sanctioned bridge has been erected.

15. In these sections all the walls which have been provided with a pile facing protected by a stone revetment answer well and do not leak.

16. This section is for the most part in cutting and the masonry works are unimportant.

4th Section.
44th to 60th mile.

The banks are all full height have been put in section, and are in good order. The distribution channels laid out are forty five miles in length - command 14,000 acres of land, and forty miles in length of these have been excavated.

17. Mochimurry Tunnel eight feet wide, is loudly complained of by the villagers and with good reason. It is at all times wet, and in the rainy season becomes quite impassable by reason of the silt which is deposited in it and accumulates to a depth of more than three feet.

18. A three foot Culvert being insufficient to carry off the drainage in the last monsoon was partially blown up in June, and has been temporarily repaired.

23.5- repaired - This proposed to replace it by a six foot culvert.

19. The Puzaydial Tunnel at 54.75 mile is 55th mile. Twelve feet wide and has considerable traffic. It will probably always be wet but it is quite sound and there are no spots of water in it.

20. The last seven miles are as far as this point the best looking in the Canal, the work has been well finished, the banks in good order, and full section, and the leakage very trifling.

21. Aracopilly Bridge sanctioned in Government Order No. 916-19th.

5th Section.
61st to 72nd mile. March 1889 consists of the usual three arches of

Twenty five feet span, which are found to cost less than wing walls. The piers and abutments are completed, and the centering being put up. The work is very good and the stone of a superior quality and well adapted for coursed rubble. The rates are four and a half Rupees per cubic yard in the piers and abutments, and six and a half Rupees in the arch - all contract work.

22. Aracopilly Aqueduct was built last year and is in good order, but leaks somewhat by spots through the wing walls and abutments. It is hoped that the leaks will be gradually stopped up.

is up by silt deposited, but I don't share in the ex-
pectation.

123. Locks Bridge 2nd Class sanctioned in Go-
vernment Order No. 199.

21st January 1869 is similar 67th mile 10 chains.
a to the one at Viragipilly - the arches are all turned
by the last having been keyed on the 2nd instance. The
work is all very good.

124. In this Section, the girths the bands have
not been riveted, as it was
thought they would stand
without this precaution. Experience shows that
they fall in a good deal from the wash of the water
line, and it will be necessary to rivet them through-
out before the Canal is brought into general use.
This can be done I understand with large solid
timber, which answers admirably, and costs
about one and a quarter Rupees a cubic yard.

125. Pamulpand Bridge - three arches - sanc-
tioned in Government Order
No. 1557 2nd May 1868 was 69th mile 20 chains.
is completed three months ago. The work is very
of good.

126. Veshikul - This is the terminal point
of the water at present, seventy
four and a half miles from
Sankavala by the new measurement, and here
the water is stopped by Lock No. 1 which is a
regulating

regulating lock for the 6th Section - the surplus
water at present escaping by a natural calin-
culah a little higher up and drains into the
Canals.

27. This Lock is filled by means of a re-
volving shutter on the principle of a com-
mon flap. It was worked with difficulty -
owing to the line being out of force. It
seems a very efficient contrivance for rapid-
ly filling or emptying a lock - the water
issues with such velocity as to pass by the
intake for filling the lock, and practically
fills it by passing into the lock by the open-
ings at the lower end of the sluice intended
for emptying the lock.

28. I said before that this was the only
value of the time, and that the one to be adopt-
ed for general use on the Canal is a rolling
shutter which is raised vertically - friction
being reduced by means of rollers moving on
rails, but I have not yet seen one and I
cannot offer an opinion about it.

29. The Canal from this point for a dis-
tance of six miles is one contour line - the
elevation being only one foot, and the Canal
running between double banks.

Lock

30. Lock N^o 2 - Two chambers with a double drop of 10 feet. 6 miles 2 chains 10 inches - one complete the other about three quarters done. Locks N^o 2 A and N^o 3 are each about nine feet high - complete - All the work lately done, and now being done in these locks is superior, and contrasts most favorably with the old work. The rates are three and a quarter rupees per cubic yard.

N^o 4. Lock has two drops of 10' 10" and is a very heavy piece of work - the foundations being of great depth & reach rock. It is about three fourths done - the rates Rupees 4 a cubic yard for rubble, and 8 to 10 for cut stone. There are two arches of twelve feet span under the upper reach for drainage and to be used as a traffic way.

Lock N^o 5 - Ten foot drop is all but completed.

Lock N^o 6 - Ten foot drop - will be finished this month.

Lock N^o 7 - A double drop of nine feet is nearly complete.

31. 83.75 mile old Culvert N^o 6 close to Vellapanoor is built as an Aqueduct, seven arches of twelve feet the structure has been completed, and the work is very good.

32. All the Earthwork in this, the 6th Section Earthwork is backward, the labor and attention having been concentrated on the Masonry works on which the progress had been very great. The earthwork is not heavy and will now be rapidly proceeded with.

33. The arch 40' span and two land arches of 20'. The piers and abutments are completed, and the centering being put up.

34. The following works Locks N^o 8 & 12 are completed as regards the masonry work or very nearly so.

Lock N^o 8 - A double drop of 8 feet close by a ravine has breached the banks and it is proposed to build a culvert which appears very necessary.

Lock N^o 9 - A double drop of 8 feet - and a 1st drop of 8 feet with three arches over a ravine.

Lock N^o 10 - A double drop of 10 feet.

Lock N^o 11 - One drop of 10 feet with a bridge over the tail bay.

Lock N^o 12. One drop of 10 feet 9 inches. Between this point and Cooboor the bye wash of the river has breached the banks which will require to be reworked.

25. Lookout Ancient The remains of the
old Lookout Ancient,
7th Section. 92nd to 114th mile
or by new measurement 95 to 117. which was thrown
over by a fresh

in July last, have for the most part been
cleared away, and the foundations are being
dug out. The design for a new Ancient has
been prepared, and will be submitted at an
early date, I understand that it provides a
foundation two feet below the water cushion
of the old work. There was too much water
in the Canal for me to see the floor of the
cushion, but if it is at all damaged, as I think
it must be, it should be taken up and be re-
placed by a much more substantial flooring
of deep stone pitching, and I would recommend
that the foundations of the Ancient be carried
through all the strata of shale, until solid stone
is reached, although only 2 feet extra foundation
is provided in the plan.

26. The quantity of water to be received at the
head of the 7th Section is 100,000 cubic yards
an hour of which it was intended that only
35,000 should be used for irrigation in the upper
portion of the Section, as the remaining quantity
would be necessary for maintaining a depth of
5 feet in the lower portion of the Section for
navigation

29
navigation, and it had been proposed that 46,000
cubic yards should pass into the 8th Section as
its supply, which would necessitate the construc-
tion of surplus sluices for the discharge of
54,000 cubic yards in the 7th Section. The Chief
engineers now objects to passing any water for
irrigation into the 8th Section as he considers
that a greater quantity than the whole of what
is available can be utilized for irrigation in
the 7th Section, and more economically than by
passing it on to the 8th. I am not aware of
any objection to this course, and if the Govern-
ment have none the greater part of the 65,000
cubic yards an hour remaining as above will
be used for irrigation in part of what is now
called the subdivision that is from the 1st lock
in the 8th Section or at the 115th mile for a length
of six miles or to the 121st mile. Then suffi-
cient water for navigation only, that is lockage,
evaporation, and leakage, would pass into the
lower part of the 8th Section in which there
would not be any works for surplus discharge
and one eatingulak and scouring sluice above
the lock at the 115th mile capable of passing
100,000 cubic yards an hour would suffice.

27. Work No 2 - a second class bridge, two
92nd mile. - arches of thirty feet, the enter-
ing has just been put up. -

Work N^o 3 - Calingulah, three vents of 5 feet complete.

38. Work N^o 4 - Calingulah

93rd mile.

Work N^o 5 - Calingulah two vents of 5 feet.

39. Work N^o 6 - Calingulah not begun - 94th mile.

Work N^o 7 - Culvert two 5 feet vents.

Work N^o 7 A. - is a second class bridge - two arches of 30' span - The piers and abutments are up. - Little work is going on - labor is scarce, and no carts obtainable at present.

Work N^o 8 - is a culvert, two vents of 5 feet, which from its present appearance I would consider much too small.

40. Work N^o 9 - Calingulah, said to be half complete, but the sluices have not got above ground level.

96th mile.

41. Work N^o 9 A. - Second class bridge - two arches of 30 feet.

97th mile.

42. Work N^o 10 - Culvert, two vents of 20 feet sanctioned originally, but has been converted into four vents of

98th mile.

10 feet, and will be built as an aqueduct. The foundations of the piers are reported complete but all is covered up at present.

43. All this portion of the Canal requires to be cleared out, and the banks made up, and put in section.

Earthworks.

Work

931
Work N^o 10 A is a culvert, two vents of 5 feet.
44. Work N^o 11 - A three foot culvert.
99th mile. completed.

Work N^o 11 A. - A third class bridge, two arches of 30 feet span is complete except the approaches.

Work N^o 12 - A three foot culvert.

Work N^o 13 & 14 - were intended to be culverts each with one vent of 8 feet - they have been abandoned and their capacity included in:

Work N^o 15 - which originally was intended to be a culvert with one vent of 10 feet ^{but} has been constructed with six vents of 5 feet.

45. Work N^o 17 - is a siphon sluice, six vents of 5 feet, completed, and has 102nd mile. - above in it N^o 18 which was intended to provide one vent of 10 feet.

Work N^o 19 - called an aqueduct is built as a culvert, five vents of 10 feet.

46. Work N^o 19 A. - is a second class bridge, 104th mile and is complete except the approaches. It has two arches of 30 feet and two land arches of 20.

Work N^o 20. is an aqueduct over the Palat and consists of 22 arches of 10 feet.

47. Work N^o 21 - a culvert - three vents of 105th miles 8 feet, one of which will be used as a passage for cattle.

Work

48. Work N^o 22 - Culvert 4 vents of 106th mile. 5 feet complete.
49. Work N^o 23 - is a skew bridge at Syalom. Two arches of 25 feet span. This is first bridge complete and is a round substantial work and well finished.
50. Work N^o 24 - an eight feet culvert 107th mile. not yet begun.
51. Work N^o 24.1 - a second class bridge not begun.
52. Work N^o 25 - a culvert four vents of eight feet not begun.
53. Work N^o 25.1 - second class bridge not begun. 110th mile.
54. Work N^o 26 - a culvert four vents of 111th mile. right feet up to springing.
55. Work N^o 27 - is a second class bridge at the Jacumilla. Two arches of 30 feet. The pier and abutments built, and centering up.
56. Up to this point the Canal is full depth. The banks where made of black cotton soil are a good deal cut up, at other places where the soil is gravelly they stand well. It will be necessary to turf the greater part of these banks, and to erect the inner slopes where the wash of the water will come.
57. A second class bridge - the foundations are dug out. 114th mile.

54. From the 111th to the end of the 115th miles the Canal is now Earthwork. being taken out to full width, and the banks are being made up.

55. From the 115th to the 120th and $\frac{1}{4}$ mile 8th Section - 113th to 114th mile. There are eleven locks in various states of progress. In N^o 1-4-5 the excavations are completed, and the foundations being taken out. N^o 9 is about $\frac{1}{3}$ built. N^o 2-6-7 and 10 are each from about $\frac{1}{4}$ to $\frac{3}{8}$ done, and N^o 3-8 and 10.1 are almost complete as respects the masonry work.

56. From 117.24 miles to 121.25 the banks are being formed - the excavation which will be very slight is not yet done, thence to 122.25 the bed is being dug out and is well advanced, and is in the same condition as far as 128.25. The bed in each reach begins with a cutting 3 to 7 feet deep, and ends 2 feet above ground level. At two of the locks permanent huts for lock keepers have been built, and charged to contingencies being used as offices by the Masonry Inspectors at present. The masonry work in this portion of the Canal is being done by daily labor, and is very good, neat, and substantial, the whole is expected to be completed by end of February 1870.

57. Lock N^o 11 - one drop of 12' 6" and with a bridge is almost finished - the stone used is superior - the work very good - done entirely by daily labor, and the cost all over including carting averages Rupees 3:4:0 a cubic yard. - 131.25 mile

58. A second class bridge, one arch of 40 feet and two of 20+ feet and abutments are built. - 135.25 mile

59. Lock N^o 12 - one drop 13' 10", the work is about half done. - 135.5 mile

60. Lock N^o 13 - drop 12' 6" work three quarters done. - 136.5 mile

61. The Earthwork from Chintacootah to this or for a distance of 10 miles is far advanced and will be completed in a few weeks. - 139.5 mile

This is decidedly the best time of the year for work of this kind, and it is hoped the banks will be a good deal consolidated before the next heavy rains, but as there is no provision for resetting or surfacing, I fear that the repairs which will be necessary at the close of the next South-west monsoon will be serious. -

62. Lock N^o 14 - with a second class bridge drop 12' 6", will be completed in three weeks. - 140.5 mile

63. Lock N^o 15 - drop 12' 6", work less than half done. - 142.5 mile

Aqueduct

Aqueduct, three flat arches of 5 feet each, is complete, except the plastering. - 142.10 mile

The bridge which has been sanctioned is not yet commenced - stone has been collected. -

Below the vent of 5 feet - walls have reached the ground level. - 143.2 mile

Lock N^o 16 - drop 13 feet - the foundations are being cut out. - 143.17 mile

Here the 8th section ends in which the earthwork was being fast completed, and the banks well and neatly formed - the rates for the most part 10 cubic yards per rupee but in some cases 8. -

This work was completed last April except the coping for one Rajoly Mient. - half the length. - Below the freshes in the last South-west monsoon well, no stones having been displaced, except in the bed of the river below the work where a good deal of stone was broken up, including some large slabs, which the water has filled up in front of the Mient, forming a natural water cushion that will be beneficial. The river is reported to have passed over the Mient nearly 8 feet deep in the last monsoon. -

A

... Culvert two spans of twelve feet. 144.67 mile

... A second class bridge completed nine months ago. 145.25 mile

... A culvert, five vents of five feet. 145.77 mile

Vaikatair Aqueduct, ten arches of 20 feet, was completed in June last - appears to be a substantial work but the stone is ill shaped - the mortar joints, and the mortar itself very coarse, giving the whole a rough appearance - considerable leakage must be expected.

From Rajoly for six miles the earthwork was all completed about two years ago, with the exception of a small portion at the head, and some trimming and filling of gaps - the banks have had the rains of two monsoons and have stood well.

... A five feet culvert. 150.12 mile

... A second class bridge. 150.30 mile

... An aqueduct, five arches of twelve feet, completed. 150.74 mile

... A culvert two vents of 5 feet. 151.15 mile

... A second class bridge. 152.66 mile

... A culvert three vents of 12 feet the arches being turned. 153.35 mile

... A culvert 3 vents of 9 feet just completed. 154.25 mile
... A second class bridge commenced. 154.64 mile

A

... A culvert, 3 vents of 9 feet, 155.15 mile. just completed.

Dhoor Aqueduct, two arches of 20 feet, crosses the drainage of the Dhoor Nank and is intended as a second class communication also. This too low for loaded bandies but will suit for cattle, ploughs, and manure carts. The villagers complain a good deal of its insufficiency, but as there is a second class bridge two miles higher up, and a first class one for the public road to Cuddapah one and a quarter mile lower down, they have as much facility for crossing as there is in any other part of the Canal.

First class bridge - The abutments and wing walls are built, and the centering is being put up. 158.69 mile.

From Edimuddiah to Dhoor, for the last nine miles, excepting short patches near some of the masonry works, the earthwork was all done nearly two years ago - the banks stand well, but require a little making up and trimming.

... A twelve feet culvert. 159.60 mile.

Surplus water No. 1, 72 feet long, to discharge 159.66 mile. 15,000 cubic yards an hour with a six inch head is more than three quarters finished.

Na

An aqueduct three spans of 12 feet in-
tended also as a traffic passage 163rd mile
for which it is quite unfit.

163rd mile is the position of what had been in-
tended as surplus weir No. 2 to discharge 15,000
cubic yards. The Executive Engineer now pro-
poses that it should be given up, Nos. 1 and 3
being ample, and so it would appear as the quan-
tity of water enters this part of the section
except at the head sluice, ^{where} it can be shut off is
insignificant.

A culvert four vents of 7 feet over the
outlet of the Chintacootah 164th mile.
work is completed.

Moocapilly Aqueduct - eight spans of
15 feet, was intended also as a 166.20 miles
traffic way for which it is quite unfit, the
width of water way is 30 feet, and the work
has just been completed.

A culvert, two vents of nine
feet. 166.65 miles.

Peechapad Aqueduct - seven arches of
9 feet lately completed - can 167.21 miles
be used as a traffic way except for high loads -
the masonry is sound and good. The Executive
Engineer proposes the erection of a
bridge at 162.50 mile, and another at 165.5,
both of which appear very necessary.

From

From whom to Peechapad a distance of
Earthwork. right and a quarter miles the
excavation of bed and forma-
tion of banks was commenced at the close of
the last hot season, and is all well advanced,
excepting patches of a few chains in length in
the Canal is full width and depth, and the banks
formed. The rated average eight cubic yards
per rupee, and the work is well done. The Ex-
ecutive Engineer having been particular in ex-
amining them during formation, and the soil is
for the most part suitable.

Site of No. 3 surplus weir which is 150-
167.24 miles. feet long and is more than three
quarters built. It will have a double overfall
and water cushion, and another fall a little lower
down the race to lower the water to head of stream.

Rather this work nor No. 1 surplus weir
mentioned above had been sanctioned. When some-
thing was acted some months ago the Consulting
Engineer took exception to the position of the
first as being needlessly close to the head of the
section, and recommended a reconsideration of
all the designs with the object of having more
compact & less lengthy works constructed - but
the work had been actually commenced and well
advanced before hand of which no mention was made.
It is now too late to alter either the designs or the
sites

sides except at great loss - The works are being built on the principle that has been followed throughout the Canal of self-acting weirs discharging with a small head and there is nothing objectionable in the sides, but it is to be regretted that the Company's Engineers will continue to execute works without approval, in hopes that when the formality of seeking sanction has been gone through, no objection will be raised.

From the 169th to the 178th mile, on the side of the Dhoo Division, there are eight locks in various stages of progress. In Nos 7 and 8 the foundations are being taken out; Nos 1, 2, 5 and 6 are from three fourths to nine tenths built, and Nos 3 and 4 are all but complete as respects the masonry work. Some of these locks the mortar joints are very coarse, they will all require pointing and with special care where there is any seepage.

A siphon sluice for the drainage channel of the Mid Moor Cuts. 170.50 mile. is complete.

A siphon sluice - Foundations are being taken out, all in rock. 173rd mile.

Another siphon sluice has just been commenced. 173rd mile.

From

From the 169th mile for about five miles the cutting for Canal and formation of banks is about half done - Two miles more towards Adimappully is only begun, and two miles have not been commenced. The tail lock - Dhoo Division has not 178th mile. yet been commenced.

The foundations have been laid for a length of 400 feet from the right bank of the Pennairs. Adimappully Ancient. 12 feet wide, and two feet deep on rock - the whole length to be built in this way is 540 feet. The total length of the Ancient will be 2240 feet. Of that portion which was intended to be on wells a length of 500 feet is being built on hard clay, the wells having been dispensed with as clay was found near the surface, for the portion to be built on wells the rear row and the middle row of wells have been sunk all across; the middle row are reported to be four or five feet deep, and the lower row eleven feet deep. The front row of wells has not yet been sunk. Work for the season is scarcely begun as the freshes may only now be said to be over, and a viaduct on the tram way which was carried away in the rains has not yet been repaired as the foundations could not be got at. A good deal of stone has been collected, much of it of a very superior quality and

and a hundred waggons are in readiness for use on the tramways.

Second mile - an aqueduct the Puntal -
-vintah - seven arches
of 30 feet - the pier ^{back} erect. ^{10th Section.}
ed, and the centering about to be put up. - ^{Adimappully to Cuddalore.}
^{10.8 miles.}

A drainage culvert, ten feet wide -
not yet begun. - ^{4 1/2 mile.}

Egghon culvert, two vents of ten
feet - foundations dug out. - ^{5.5 mile.}

Woodanappully bridge, second class -
complete except the approaches. - ^{5 1/2 miles.}

An aqueduct - four spans of ten
feet - has been completed. - ^{5.74 mile.}

A ten foot culvert not begun. - ^{7.50 mile.}

The first two miles in this Section have
only just been begun - for a
further length of three miles ^{Earthwork.}

it is complete, and in some places the banks
and even the cuttings cut a good deal - the
next two miles are in various stages of pro-
gress, and ground has not yet been broken in
the eighth mile, which ends the 10th Section.

Those received from England are on the
same principle as what were
made in this country and are ^{Canal sluice fittings.}
use in the upper sections, but the thread of
the

15-43.
the screw being square they work much better.
The supply is very late - I only saw
Lock shutters or valves. one, namely that
described for regulat-
ing lock at Lockinula. -

Appears to be very backward - none
Lock gates. have been put up, except in
the one lock, and I did not
see or hear of any more having arrived on the
Canal. -

Have the honor to be,
Sir,
Your most obedient servant,
J. J. M. Wall C. S. D.
J. J. M. Wall & Co. Company.

Copy in O. W. L. & Co.
of 21st March 11/8/70

Pro. of 11/8/70
The C. & G. Co.
The Secretary to Government
S.P.H.

Dated 30/11/04
Recd: / 1/ Decr 04

Submits report on the
condition and state of the works
of the M. & C. Co. as found on
a tour of inspection which took
place between the 26th ult. & the
18th instant.

N. 633

N. 330-26 Jan 2/20.

Public Works Department.
N. 330-30
Proceeding of the Madras Government.

Under date the 26th Jan 1904.

Read the following

From The Ag. Consulting Engineer
for Irrigation & C. Company
H. E. N. 106 of 30th November/04

The Government
observe that the breach
which occurred in August
last by the failure of

N.
A.
P.W.E.

the Sulphuric Lime works to
have been repaired,
and that the water
which had been
shut off in consequence
of the accident, had
at the order of Colonel
Carpendale's inspection
arrived up to the
first regulating locks
at the 73rd mile.
Looking to the
injury to which the
Kinch aqueduct is
exposed by these works,
it is off in a moment

41.
that all possible pre-
cautions should be
adopted to make the
work water tight, and
Colonel Carpendale
will accordingly bring
under the consideration
of the Company's Chief
Engineer the suggestion
in Para 5. He will also
communicate those
in Paras 6, 10, 14, 24 and
25.

His Excellency
the Governor in Council
sees no objection to the
arrangements proposed
in para 36.

The

Copy in D. W. Little to Genl
of 21st March 1870 no 117/1870

(7)

and should Mr Little
and The Government
cannot too strongly
deplore the practice
to which Colonel
Carpendale adverts
in para 92, under
which the application
for sanction to plans
and estimates becomes
a proceeding so utterly
formal, as to render the
control which the Congress
is expected to exercise
almost nugatory

To the Honorable Mr. Little
The Cong Engg
Irrigation & Co

21st Jan 1870 Q. 17

Cue 5013

Govt. of {1870} Madras.

PUBLIC WORKS.

To
The Consulting Engineer
for the Irrigation &
Canal Company

Dated

Recd.

Encl.

G. O. 26-*Jan* 1870, No. 330

Nos. 633 - 634

Works (M. S. B. Co.) Paper orders
on the letter from the Consulting
Engineer reporting the result of his
inspection of the works of the Company
during November 1869.