

1. Date of receipt: 20
2. Date of receipt: 27.3
3. Initials of Receiver: 3

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MADRAS RECORD OFFICE.

Government of Madras.

Public Works DEPARTMENT.

G.O. No.	1085	Press Mis.
389-39c		
Dated	24-4-	1865.

Not to be folded or roughly handled

*Proceedings of the Madras Government, Public Works Department,
24th April 1865.*

No. 389. Read the following letter from Captain J. MULLINS, R. E., Consulting Engineer for Irrigation and Canal Company, to Colonel C. A. ORR, R. E., Secretary to Government, Public Works Department, dated Bellary, 16th March 1865, No. 226 :—

SIR,

1. Having just returned from a visit to the Wallavapore anicut, and an inspection of the country through which it is proposed by the Madras Irrigation and Canal Company to carry a line of canal, from that anicut to the neighbourhood of Bellary, in the first instance, I have the honor to report for the information of Government such particulars regarding this work as were ascertainable in the present state of the investigation.

1 Tracing.

2. The line which has been selected after a protracted examination of the country, the difficulties presented by which have been already brought* under the notice of Government, is that by Hospett, Camlapore and Ooparhully, and, so far, its general direction corresponds with that of the line reported on by Lieutenant Tyrell, but in 1856 it was considered impracticable to get into the valley above Darojee tank, and one great difficulty of the scheme as formerly reported on, was the crossing of the low ground below that tank. It has been found, however, that the hills south of the valley running eastwards by Ooparhully and Dewallapore, present to the south of the latter village a narrow saddle of very considerable height, but through which it is proposed to run a tunnel, and thus reach the country above Darojee tank. A trace from the Atlas sheet, showing the course of the canal to Aldhully, about two miles west of Bellary Fort, is enclosed. The portion in the valley above the Darojee tank is a rough approximation, the rest may be considered very nearly correct.

* Extract Minutes of Consultation, No. 33, 7th January 1857.
Chief Engineer's letter No. 7,221, 11th October 1856.
Acting Civil Engineer's, 3rd Division, letter No. 231, 10th September 1856, with its enclosure.
Lieutenant Tyrell's report.
Memorandum by Colonel (then Major) Lawford, 14th October 1856.

3. At the Wallavapore anicut the Toombuddra is divided into two branches by a small rocky island of considerable elevation. Its bed here is granitic rock all across, and at short intervals masses of this rock stand up to a level of 12 and even 15 feet above the deep bed.

4. The old native anicut was formed by packing great masses of large rubble stone in a horse-shoe form between the elevated rocks. The stone used was well adapted to the purpose, and some of the blocks are of enormous size, and their placement in the anicut must have been a work of great labor. The width of the dam thus formed varies from 50 to 80 feet. The top surface has a slight fall to the rear, and the water on reaching the lower edge falls on to solid rock. This native anicut is still all that bars the left channel of the river, but below that old work across the right channel a massive wall† has been constructed of the same height as the rough stone weir, and its top course consists of single stones carefully dressed and secured by dove-tailed iron clamps.

† Length 1,000 feet.

The Irrigation Company propose to do nothing to the anicut across the right channel at present, but it is intended to build a somewhat similar wall‡ across the left channel in a straight line. The maximum height of this wall will be 19 feet, and its average height about 10 feet.

‡ Length 1,100 feet.

5. The main channel will have its bed 7½ feet below the crest of the modern anicut across the right channel, and as the existing Raya Calava occupies the only favorable ground available, the latter will be widened, nearly as far as its head sluice, to carry the supply for both channels, and the Company's canal will then curve round between the river and the Raya Calava, and a head and scouring sluice will

be placed about 500 yards lower down, where the ground is favorable for the purpose. At about a mile from the head the canal will cross the Raya Calava at a level, and between this point and Amravutty, a length of about nine miles, it will cross and re-cross some four times.

6. The Raya Calava already occupies by far the most favorable strip of country for the formation of a canal, and, like most Native channels, it winds about so much, as really to take up a great deal of room. Its present state is not a very efficient one, and it appears to me that it would be the best plan to allow the Irrigation Company to make use of the ground occupied by it, so far as the two channels will run together, and where the Company's canal turns southwards, about the 10th mile, to give the Raya Calava a sluice. This plan the Executive Engineer, Mr. Lowe, thinks would lessen the cost of the Company's canal, and there would be no difficulty in arranging for the Raya Calava obtaining the full supply to which it may be entitled.

7. From Wallavapore to Hospett, a distance of about $12\frac{1}{2}$ miles, the country is open, the undulations of moderate elevation, and the soil not difficult, so that although for some miles from the head the canal will be in 15 feet cutting on the average, its cost per mile will probably not be excessive.

8. I should mention here that it is proposed to carry 3,00,000 cubic yards per hour in the first instance, leaving it open to increase the supply to 5,00,000 cubic yards hereafter, by raising the anicut.

9. From Hospett to Nellapore, the distance will be about 17 miles, and the first six or seven miles will carry the canal by two great sweeps to the foot of the hills south of Camlapore, where the real difficulties of the line commence. All along these hills up to Nellapore the country is rocky and very uneven, and in many parts walling will be necessary, owing to the absence of suitable soil for embankments, and at one point, near a conical hill, a narrow saddle will require to be pierced by a tunnel about quarter of a mile in length.

10. From Nellapore to the Darojee tank is eight miles, and the difficulties are very formidable. Immediately to the eastward of Nellapore is the water-shed dividing the drainages, which fall westwards into the Toombuddra near Nimbapore, from those running eastwards into the Darojee surplus channel. The crest of this saddle is 110 feet above the canal level, and the only practicable means of getting past it will be a tunnel, nearly two miles in length, supplemented by deep cuttings at either end. From the appearance of the surface soil it is not certain that solid rock will be met with throughout the tunnel, and at present therefore all that can be said is that the cost of these two miles may, for a tunnel of 50 square yards section, which is about what would be required for irrigation only, lie between 3 and 10 lacs. After passing the saddle there is some tolerably favorable ground, but much that involves cutting through nearly solid rock up to the point where the line turns southwards to get through the hills bounding the Darojee tank on its north-west side. To pass these hills, in addition to heavy open cuttings, a tunnel half a mile in length will be necessary, as the lowest saddle is 157 feet above the level of the canal, and here there is no doubt about the rock, for there is nothing but rock to be seen.

11. The crest of the calingulah of Darojee tank is 62 feet below the crown of the Wallavapore anicut, and the water surface of the canal on leaving the hills will be 39 feet above the Darojee calingulah. There is no other way of getting out of the basin of the tank, than rounding the hill at the south-east end of the Darojee tank bund. This point, in a direct line, is about three miles distant, but, to preserve the level requisite to command the country beyond, a wide sweep, 15 miles in length, is required. The country is not difficult, but the supplying nullahs or rivers of the Darojee tank have to be crossed, and even if the proposed plan of passing these by weirs be adopted, the works will necessarily be costly, for the rains in the Soondoor valley are sometimes very heavy, and the Darojee tank has been known to rise 18 feet in as many hours.

12. From the south-east end of the Darojee tank bund to Aldhully, where the line of the main canal ends for the present, is $20\frac{1}{2}$ miles. The country is open and undulating, the soil not difficult generally, though, from the trial pits which I inspected, and from the pits from which road material has been obtained, it may be concluded that much of the cutting will be in lime kunkur and shale.

13. A glance at the Atlas sheet will show that, until after passing the hills at the south-east end of Darojee tank bund, the extent of possible irrigation will be very small. Thereafter there is a wide extent of country, and it may be admitted that ultimately all the water which can be brought down will find land on which it can be utilized.

14. The line for the canal has been selected from Wallavapore to Darojee, and from the south-east end of Darojee tank to Aldhully near Bellary, and is being permanently marked out. The 15 miles in the basin of the Darojee tank have still to be gone over again, before deciding whether any portions require modification or not. The whole length of main canal between Wallavapore and Aldhully will be about 73 miles.

15. The materials for preparing the fair survey sheets are now ready, and after these are finished there remain the plans and estimates of the works to be done, and both these will need great care in their preparation, and, in all the more costly parts of the line, it is essential that the nature of the soil and substrata should be completely ascertained. Trial pits have been sunk in the last $20\frac{1}{2}$ miles at short intervals, and they have been commenced in the upper sections, but for the heavy cuttings and tunnels, unless it be clear from the surface that only rock will be met with, much labor and some considerable expenditure will be necessary, in order to obtain reliable data for the formation of the estimates, and the experience gained on the Kurnool works should be made full use of in determining the rates. Mr. Lowe thinks that the estimates may be ready in about six months.

16. It may be remarked here that as the trial pits will many of them be of great depth, it will be advisable that they should be carefully fenced. This point is receiving the attention of the Executive Engineer, and he has directed the excavated earth to be placed round them; I observed, however, when walking along the line, that the little banks thus formed are in themselves insufficient protection, and the rains may so far obliterate them as to prevent their being noticed. Generally, stone is very abundant, and perhaps a dry stone wall would, in most miles, be the best and cheapest fence.

17. It will be noticed that the investigations made by the Company, with a view to the formation of this line of canal, confirm in all material respects the report made by Lieutenant Tyrell in 1856. The one new feature is the possibility of getting from the Dewallapore valley into the Darojee tank basin by a tunnel of moderate length, and this new plan is, in my opinion, an undoubted improvement upon the far less practicable alternative of crossing below the Darojee tank by an aqueduct and an embankment. That the works will be extremely costly even the few remarks above given will suffice to show, and though, until the quantities are got out, it is impossible to give a fair idea of what the expense will be, perhaps a rough estimate of the probable minimum cost will be acceptable.

18. I understood that it was intended that the canal should be one of irrigation only, and it is unfortunate, if this be the case, that the levels of parts of the country between Camlapore and Darojee, and the soil of the plains below this latter point will necessitate a very moderate fall. Except in the tunnels and rock cuttings where, to save expense, the greatest possible fall will be a necessity, the falls are to vary from 8 or 9 inches a mile in cutting, to 3 inches where the soil is most favorable. These slopes will necessitate a very large square section. For some distance from the head the cutting will be 15 feet in depth, and the depth of water $7\frac{1}{2}$ feet. Taking the fall at 8 inches per mile, and allowing side slopes of $1\frac{1}{2}$ to 1 up to water surface, and 1 to 1 above that, and 3 Annas a cubic yard for the lower portion with 2 Annas for

*Proceedings of the Madras Government, Public Works Department,
24th April 1865.*

the upper portion, I find that the bottom breadth of the channel requisite would be 120 feet, and that for every running yard there would be 109 cubic yards at 3 Annas, and 125 cubic yards at 2 Annas, amounting together to Rupees 36-1-0 per yard run, or Rupees 63,470 per mile for excavation alone, and the rates are very moderate. Again, suppose the water to be 10 feet in depth lower down, the cutting 10 feet, and the soil such as to stand with vertical sides, the fall being the same, 8 inches per mile. The bottom width would be 84 feet, there would be 93½ cubic yards to the yard run which, at 4 Annas a cubic yard, would come to 23½ Rupees a running yard, or Rupees 41,000 a mile. The works for passing drainage in the first 12½ miles will not be very heavy, but there are numerous villages, and there is much cart traffic, so that a good many bridges will be needed, and altogether I think the 12½ miles to Hospett will probably cost 60,000 Rupees a mile... 7,50,000

The following 25 miles to Darojee tank, after giving due consideration to the 6 or 7 miles immediately below Hospett, and to the comparatively easy portions here and there further on, can hardly be done for less than 1 lac a mile 25,00,000

The 15 miles in the Darojee tank basin can be carried on any level deemed most advantageous, but the drainages to be crossed are heavy, and probably 55,000 Rupees a mile will not be too much... 8,25,000

The last 20½ miles to Aldhully will be somewhat less expensive perhaps, say 50,000 a mile 10,25,000

Anicut across left channel of Toombaddra and head works 75,000

At 1½ cubic yards per acre per hour the acreage, which can be supplied, will be 1,80,000, and the cost of distribution may be put at 6 Rupees an acre. 10,80,000

Establishment and plant 20 per cent 62,55,000
12,51,000

Rupees... 75,06,000

Gross return on 1,80,000 acres { at 4 Rupees } 7,20,000 or 9.6 per cent. nearly.
{ at 5 Rupees } 9,00,000 or 12 do. do.
and, looking to the length of time that would necessarily elapse before the whole area would yield a return, these per-centages can hardly be deemed satisfactory, added to which, in looking at the project as an investment, it must be remembered that nearly 8 lacs must be added to represent the value, at 5 per cent. of the capital which would be unremunerative during the progress of the works extending, as I have supposed, over a period of five years.

19. If capital can be raised on the prospect of something over 5 per cent. interest on the money invested, it may be admitted, pending the receipt and examination of the estimates, that the project has not yet proved to be economically impracticable, though Colonel Lawford's opinion to that effect was quite correct, looking to the circumstances which the Government must necessarily take into consideration before undertaking any such work. I nevertheless think that it is much to be regretted that, with the information which had been obtained in 1856 as a guide, the investigation of this project was commenced at a time when far more profitable and necessary occupation for the staff of the Bellary Division might have been found upon the works of the Kurnool project, where, upon the preparation of the plans and estimates for works of distribution in particular, this establishment

*Proceedings of the Madras Government, Public Works Department;
24th April 1865.*

might have rendered valuable assistance, and hastened the irrigation returns. It will be the best plan now to complete the estimates for the Bellary project, though even should the Company resolve ultimately to undertake the works, it seems clear that the demands upon capital for the Kurnool project will make it necessary to obtain funds in addition to the two millions authorized by their Act of Parliament, before they can be commenced. Lest also the Directors of the Company should be disposed to authorize the examination of further projects supposed to be likely to be remunerative, it might perhaps be of use were the Government to express an opinion that for the present it is, and for some time to come it will be, advisable, that the whole available establishment should be employed in designing and carrying out such works as will tend to perfect the Kurnool project, and obtain therefrom, as early as may be possible, the returns, which the large amount of capital sunk upon it should bring in.

No. 390.

ORDER THEREON, 24th April 1865, No. 1,085.

CIVIL WORKS, No. 67.

Ordered to be recorded.

(True Extract.)

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

Enclosure
1 to Mr. [unclear]

P. 226.

From,

Captain J. J. Mullins, R. E.

Consulting Engineer, said P. O.

To,
The Secretary to Government,

Public Works Department.

Sir,

1. Having just returned from a visit to the
Mullavare Aicub, and an inspection of the country
through which it is proposed by the Irrigation
and Canal Company to carry a line of Canal, from that
Aicub to the neighbourhood of Bellary, in the first
instance, I have the honor to report for the informa-
tion of Government such particulars regarding this work
as were ascertainable in the present state of the investi-
gation.

2. The line which has been selected after a
protracted examination of the country, the difficulties
presented by which have been already brought under
the notice of Government, is that by Hosur, Camalapur,
and Coparhully and, so far, its general direction
corresponds with that of the line reported on by
Lieutenant Tyrell, but in 1856 it was considered
impracticable to get into the valley above Darjee
Tank, and one great difficulty of the scheme, as
formerly reported on, was the crossing of the low ground
below that Tank. It has been found however
that the hills south of the valley running eastwards
by

* Extract Minutes of
Consultation No. 33
of 10 January 1857.

Chief Engineer's letter
No. 221-14 of 14 Feb. 1856.

As Civil Engineer's
3rd Division letter
No. 231-10 of 14 Feb. 1856

with its enclosure
Lt Tyrell's report.

Memorandum by
Colonel (then Major)
Rawlins of 14 Oct. 1856.

by Doharkully and Malavapore present to the South of the latter village a narrow saddle of very considerable height, over which it is proposed to run a tunnel, and thus reach the country above (Darojee Tank). A trace, from the Atlas sheet, showing the course of the Canal to Aldhully about 2 miles West of Bellary Fort, is enclosed. The position in the valley above the Darojee Tank is a rough approximation, the rest may be considered very nearly correct.

3. At the Malavapore ancient the Tombuddra is divided into 2 branches by a small rocky island of considerable elevation. The bed here is granite rock all across, and at short intervals masses of this rock stand up to a level of 12 and even 15 feet above the deep bed.

The old native Ancient was formed by packing great masses of large rubble stone in a horsehoe form between the elevated rocks. The stone used was well adapted to the purpose, and some of the blocks are of enormous size, and their placement in the Ancient must have been a work of great labour. The width of the dam thus formed varies from 50 to 80 feet. The top surface has a slight fall to the rear, and the water on reaching the lower edge falls on to solid rock. This native Ancient is still all that bars the left Channel of the river, but below that old work across the right Channel a massive wall has been constructed of the same height as the rough stone weir, and its top course consists of single stones carefully

carefully dressed and secured by dovetailed iron clamps.

* length 1100 feet.

4. The Irrigation Company propose to do nothing to the Ancient across the right Channel at present, but it is intended to build a somewhat similar wall across the left Channel in a straight line. The maximum height of this wall will be 19 feet, and its average height about 10 feet.

5. The main Channel will have its bed $7\frac{1}{2}$ feet below the crest of the Modern Ancient across the right Channel: and, as the existing Raya Calava occupies the only favorable ground available, the latter will be widened, nearly as far as its head sluice, to carry the supply for both Channels, and the Company's Canal will then curve round between the river and the Raya Calava, and a head and scouring sluice will be placed about 500 yards lower down, where the ground is favorable for the purpose. At about a mile from the head ~~and~~ the Canal will cross the Raya Calava at a level, and between this point and amrautty, a length of about 9 miles, it will cross and recross some 14 times.

6. The Raya Calava already occupies by far the most favorable strip of country for the formation of a Canal and, like most Indian Channels, it winds about so much, as really to take up a great deal of room. Its present state is not a very efficient one, and it appears to me that it would be the best plan to allow the Irrigation Company

Company to make use of the ground occupied by it, so far as the two channels will run together, and where the Company's Canal turns Southwards, about the 10th mile, to give the Raja Calava a sluice. This plan the Executive Engineer, Mr. Lowe, thinks would lessen the cost of the Company's Canal, and there would be no difficulty in arranging for the Raja Calava obtaining the full supply to which it may be entitled.

7. From Malapare to Hospeth a distance of about 12½ miles the country is open, the undulations of moderate elevation, and the soil not difficult, so that although for some miles from the head the Canal will be in 15 feet cutting on the average, the cost per mile will probably not be excessive.

8. I should mention here that it is proposed to carry 300,000 cubic yards per hour in the first instance, leaving it open to increase the supply to 500,000 cubic yards hereafter, by raising the weir.

9. From Hospeth to Nallapare the distance will be about 17 miles, and the first 6 or 7 miles will carry the Canal by two great sweeps to the foot of the hills south of Camlapore, where the real difficulties of the line commence. All rising these hills up to Nallapare the country is rocky and very uneven, and in many parts cutting will be necessary, owing to the absence of suitable soil for embankment, and above require to be pierced by a tunnel about ¼ mile in length.

10. From Nallapare to the Darjee Tank is 8 miles, and the difficulties are very formidable. Immediately

Immediately to the Eastward of Nallapare is the watershed dividing the drainages, which fall westwards into the Tombuddra near Nimbapore, from those running eastwards into the Darjee surplus Channel. The crest of this saddle is ~~just~~ 110 feet above the Canal level, and the only practicable means of getting past it will be a tunnel, nearly 2 miles in length, supplemented by deep cuttings at either end. From the appearance of the surface soil it is not certain that solid rock will be met with throughout the tunnel, and at present therefore all that can be said is that the cost of these two miles may, for a tunnel of 50 square yards section, which is about what would be required for irrigation only, be between 3 and 10 lacs. After passing the saddle there is some tolerably favorable ground, but much that involves cutting through nearly solid rock up to the point where the line turns Southwards to get through the hills bounding the Darjee Tank on its North West side. To pass these hills, in addition to heavy open cuttings, a tunnel half a mile in length will be necessary, as the lowest saddle is 157 feet above the level of the Canal, and here there is no doubt about the rock, for there is nothing but rock to be seen.

11. The crest of the Calingulah of Darjee Tank is 62 feet below the crown of the Malapare Anicut, and the water surface of the Canal on leaving the hills will be 39 feet above the Darjee Calingulah. There is no other way of getting out of the basin of the Tank, than rounding the hill at the South East end of the Darjee Tank bund. This point, in a direct line

line, is about 3 miles distant, but to preserve the level requisite to command the Country beyond, a wide range, 15 miles in length, is required. The Country is not so difficult, but the supplying Nullahs or rivers of the Darjee Tank have to be crossed, and even if the proposed plan of passing these by ^{be} ~~moors~~ ^{is} adopted, the works will necessarily be costly, for the rains in the Soondoor valley are sometimes very heavy, and the Darjee Tank has been known to rise 18 feet in so many hours.

12. From the South East end of the Darjee Tank bund to Aldhully, where the line of the Main Canal and undulating, the soil not difficult generally, though, from the trial pits which I inspected, and from the pits from which road material has been obtained, it may be concluded that much of the cutting will be in ~~limestone~~ and shale.

A glance at the Atlas sheets will show that, until after passing the hills at the South East end of Darjee Tank bund, the extent of possible irrigation will be very small. Thereafter admitted that ultimately all the water which can be brought down will find land in which it can be utilized.

14. The line for the Canal has been selected from Walapore to Darjee, and from the South East end of Darjee Tank to Aldhully near Bellary, and is being permanently marked out. The 15 miles in the basin of the Darjee Tank have still to be gone over again, before deciding whether

any portions require modification or not. ^B
The whole length of Main Canal between Walapore and Aldhully will be about 73 miles.

15. The materials for preparing the fair Survey sheets are now ready, and after these are finished there remain the plans and estimates of the works to be done, and both these will need great care in their preparation, and, in all the more costly parts of the line, it is essential that the nature of the soil and strata should be completely ascertained. Trial pits have been sunk in the last 20 miles at short intervals, and they have ^{been} commenced in the upper sections, but for the heavy cuttings and tunnels, unless it be clear from the surface that only rock will be met with, much labour and some considerable expenditure will be necessary, in order to obtain reliable data for the formation of the estimates, and the experience gained on the Kurnool works should be made full use of in determining the rates. Mr. Lowe thinks that the estimates may be ready in about 6 months.

16. It may be remarked here that as the trial pits will many of them be of great depth, it will be advisable that they should be carefully fenced. This point is receiving the attention of the Executive Engineer, and he has directed the excavated earth to be placed round them, I observed however when walking along

along the line that the little banks thus formed are in themselves insufficient protection, and the rains may so far obliterate them, as to prevent their being noticed. Generally stone is very abundant, and perhaps a dry stone wall would, in most miles, be the best and cheapest fence.

17. It will be noticed that the investigations made by the Company, with a view to the connection of this line of Canal, confirm in all material respects the report made by Lieutenant Sprell in 1856. The one new feature is the possibility of getting from the Srirangapatna valley into the Coorga tank basin by a tunnel of moderate length, and this view is, in my opinion, an undoubted improvement upon the former, but still a very alternative of expense, even the Coorga tank by an aqueduct and an embankment. But the work will be extremely costly, and the few remarks above given will suffice to show, and though, until the quantities are got out, it is impossible to give a fair idea of what the expense will be, perhaps a rough estimate of the probable minimum cost will be acceptable.

18. Understood that it was intended that the Canal should be one of irrigation only, and it is unfortunate, if this be the case, that the line of route of the Country between Srirangapatna and Srirangapatna, and the soil of the plains below this latter point will necessitate a very moderate fall. Except in

15
in the tunnels and rock cuttings where, to save expense, the greatest possible fall will be a necessity, the falls are to vary from 8 or 9 inches a mile in cutting, to 3 inches where the soil is most favorable. The slopes will necessitate a very large square section. For some distance from the head the cutting will be 10 feet in depth, and the depth of water 7 feet. Making the fall at 8 inches per mile, and allowing side slopes of $1\frac{1}{2}$ to 1 up to water surface, and 1 to 1 above that, and 3 annas a cubic yard for the lower portion with 2 annas for the upper portion, I find that the bottom breadth of the Channel requisite would be 120 feet, and that for every running yard there would be 109 Cubic yards at 3 annas, and 115 Cubic yards at 2 annas, amounting together to Rs. 31-1-0 per yard run, or Rupees 6,170 per mile for excavation alone, and the rates are very moderate. Again suppose the water to be 10 feet in depth, lower down, the cutting 10 feet, and the soil such as to stand with vertical sides, the fall being the same, 8" per mile. The bottom width would be 84 feet, there would be 93½ Cubic yards to the yard run which, at 4 annas a cubic yard, would come to 28½ Rupees a running yard, or Rupees 4,100 a mile. The work for passing drainage in the first 12½ miles will not be very heavy, but there are numerous villages and there is much cart traffic, so that a good many bridges will

will be needed, and altogether I think the 12 1/2 miles to the right will probably cost 6,000.

1000000
The following 25 miles to (Laropie Tank, after giving due consideration to the cost of the line immediately below Hoptill, and to the comparative easy portions here and there, the expense would be done for less than 1 lac a mile,

The 15 miles in the (Laropie Tank basin can be carried on any level deemed most advantageous, but the drainages to be crossed are heavy, and, probably 55,000 Rupees will not be too much,

The last 20 1/2 miles to Alshewly will be some what less expensive, perhaps, as 50,000 a mile
Agricultural left Channel of Doombuddra and Head Works 10,25,000
75,000
51,75,000

at 1 1/4 Cubic yards per acre per hour the acreage, which can be supplied, will be 18,000, and the cost of distribution may be put at 6 Rupees an acre
10,80,000
62,55,000
12,51,000
75,06,000

Gross returns on 18,000 acres { at 4 Rupees } 7,20,000 or 9.6 per cent nearly
{ at 5 Rupees } 9,00,000 or 12.00 do do
and, looking to the length of time that would necessarily elapse upon the whole area would yield a return, these per centages can hardly be deemed satisfactory

The 12 1/2 miles to the right will probably cost 6,000.

satisfactory, added to which, in looking at the project as an investment, it must be remembered that, merely 8 lac must be added to represent the value, at 5 per cent, of the Capital which would be accumulated during the progress of the work extending, as I have supposed, over a period of 5 years.
19 The Capital can be raised with the prospect of something, not so much interest on the money invested, it may be admitted, pending the receipt and examination of the estimates, that the project is not yet proved to be economically impracticable, though Colonel Rawford's opinion to that effect was quite correct, looking to the circumstances which the Government must necessarily take into consideration before undertaking any such work. I know that it is much to be regretted that, with the information which had been obtained in 1856 as a guide, the investigation of this project was commenced at a time when for more profitable, and necessary, occupation for the Staff of the Bellary Division might have been found upon the works of the Turnor project, when, upon the preparation of the plans and estimates for works of distribution in particular, this establishment might have rendered valuable assistance, and hastened the irrigation returns. It will be the best plan now to complete the estimates for the Bellary project though, even should the Company resolve ultimately to undertake the work, it seems clear that

that the demands upon Capital for the turnout of projects,
will make it necessary to obtain funds, in addition to
the 2 millions authorized by their Act of Parliament,
before they can be commenced. But also the
Directors of the Company should be disposed to
authorize the examination of further projects
supposed to be likely to be remunerative, it
might perhaps be of use were the Government
to express an opinion that for the present it is,
and for some time to come, it will ^{be} advisable,
that the whole available establishment should
be employed in designing and carrying out
such works, as will tend to perfect the turnout
project, and obtain therefrom, as early as may be
possible, the return of the large amount
of capital sunk upon it should bring in.

I have the honor to be,

Sir,

Your most Obedient servant,

Wm Hamilton Captain, R.E.

Commanding Engineer, A.C.C.

1865 Dept
Proc of Govt for April.
No. 1119

The Consulting Engineer,
Land, C. S.

The Secretary to Government
S. W. C.

(Laid 16) } March 1865.
(Despatched 23)
(Received 24)

me: T. W.

Civil Works

Reports on the progress made
in the investigation for a Canal
from Calcutta to the town
situated to the northward of
Baitary.

Recd

March 1865
24th April 1865

Reinforced

c. 10, 1085

No. 389.390

c. 125, 1364 C. T.

10, 1083-215 216/65