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Public Works DEPARTMENT.

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No. 34. Read the following letter from Colonel C. E. FABER, Chief Engineer; to H. FORBES, Esq., Acting Secretary to Government, dated 27th February 1858, No. 7702.

SIR,

1. In continuation of my letter No. 7590, dated 24th February 1858, I have the honor to forward for submission to Government, the preliminary General Report received from the District Engineer of Bellary on the Toongabuddra project now under investigation by that Officer, together with a Statement of the Height of water in the Toombuddra at the Wallabhapoor Ferry during the last 12 years with a return shewing quantity of rain fall at the Cusbah Station of each Talook in the Bellary Talook since the year 1852.

2. The Government will not fail to notice that the further elaboration of the details of the whole scheme is being mistakenly pursued by the District Engineer and many of the Departmental skilled subordinates. I trust to be speedily authorized to instruct Lieutenant Fisher that the Government have dispensed with any further detailed investigation of the project, and that the series of levels may be at once laid aside.

Letter from Lieutenant J. F. FISHER, District Engineer of Bellary; to Colonel C. E. FABER, Chief Engineer, dated Camp Darojee, Talook Kumply, 12th February 1858, No. 389.

SIR,

In obedience to the instructions contained in your Memo No. 6, dated 27th January 1858, I have the honor to submit the first report on the Toongabuddra project, I trust the many imperfections in this report may be excused, the levels not being sufficiently advanced to enable me to lay a complete project before you with detailed plans and estimates of the proposed works but I am in hopes I shall be able to shew in considering this subject that sufficient information has been obtained to warrant the project being recommended for the favorable consideration of the Government and the Court of Directors.

2. To Colonel Cotton will of course be left the determination of the manner in which the funds are to be obtained for prosecuting this project I propose merely to consider the water supply, the area likely to be irrigated, the increased revenue and produce to be obtained from the execution of the works and the establishing a line of navigation through this District to be connected with the East and West Coasts.

3. *The water supply* many calculations have been given regarding this based entirely on the area drained and the probable rain fall, this latter has been assumed as high as 48 inches and as low as 24 inches. I have the honor to submit a statement* furnished me by the Collector of Bellary shewing that in this District on an average of 5 years the rain fall is barely 18 inches, all these calculations are likely to leave the question still a vexed one and it is fortunate that, thanks to the late Captain Shaw of the Engineers and the records maintained by his instructions, we can at once shew the quantity of water available in the Toongabuddra both for irrigation and navigation.

4. The Wullabapoor annicut is 336 yards in length and the Koragul 514 making a total length of 850 yards or 2550 feet but as the latter work is not perfectly straight across the river it will be sufficient if we take the total length to be 2500 feet, I calculate if one foot of water passes over these weirs the discharge is 1,210,000 cubic yards per hour: with a head of 6 inches the discharge is more than 400,000 cubic yards per hour and with a head of 3 inches it will be 150,000 cubic yards per hour and this is not at all taking into consideration the quantity which escapes through the Koragul annicut or the sluices in the Wullabapoor annicut which have never been closed, this must be considerable as I calculated the other day, when 3 inches of water was passing over the Wullabapoor annicut, from a section of the river at Humpsaugur and the observed velocity that at least 240,000 cubic yards of water were still coming down the river.

5. From an examination of the records and these calculations it is quite apparent that there is sufficient water in the Toongabuddra for 6 months supply for more than one million acres of land and that sufficient water passes down the river during the freshes which if stored

would irrigate as many acres all the year round and establish a perfect navigation right across the peninsula from one coast to the other for the same period. I do not propose touching upon the subject of reservoirs beyond saying that I consider a very good site for one on the Toongabuddra exists near Hospett, I have examined the river up to the confluence of the Wurdah and have found no place equal to this, just below Mangalah where the river intersects a range of hills a reservoir might be constructed but I am certain that such a water speed above the bund will not be obtained there, before leaving this subject I would earnestly beg to recommend that the Toongabuddara and all its tributaries be thoroughly surveyed and examined and sites for reservoirs in their beds determined.

6. In these calculations of the water supply I have only taken into consideration the water in the river above the Wullabapoor annicut before the Toongabuddra joins the Kistnah below Kurnool it receives the drainage of a large part of this District, of that of the Raichore Doab and the Huggry river these will have to be considered in connexion with the irrigation of the valley of the Koondaur and the storing of a large quantity of water in the Cumbum tank.

7. *The area to be irrigated.* In the report I had the honor to submit to you for an annicut below the junction of the Huggry with the Toongabuddra I stated the area likely to be irrigated in the Adonie Talook to be 300,000 acres Mr. Pelly the Collector in reviewing this report full corroborated this statement, if the irrigation commences now as it is proposed to do at the Darjee tank, passing round by Bellary to the confluence of the Huggry and Chinnahuggry and thence by Ioladarasee, Halhurvy, into the valley of the Hundry about the Auspary I do not think I am exaggerating when I say 700,000 acres of land will be found available for irrigation in this District a much smaller area than it has been shewn the water supply is capable of cultivating for one crop.

8. From the map the area will appear to be much larger but I do not think that in this District we can calculate more than 350 acres to a square mile, I have the honor to annex a statement of the ayacut lands in the three Talooks likely to be irrigated from this it will be seen that the average number of acres per square mile is only 340.

	Square miles.	Ayacut lands.	Remarks.
Bellary... ..	936	3,67,705	Average per square mile 340 acres.
Adonie	924	3,01,104	
Goolliem	720	2,16,267	
Total...	2,580	8,85,076	

from this Statement it might appear that the area which I have assumed is somewhat too large as there must be about the Hills high lands at present cultivated to which it would be impossible to lead the water and a large area along the right bank of the Huggry it is well known has been destroyed by the sand thrown up by the westerly winds out of the bed of the river, since the survey was made, but I am not inclined to think the assumed area is too large as it is expected we shall be able to extend the irrigation into the valley of the Hundry and along its right bank in the Punchpollem Talook the accounts of which I have not yet received.

9. It has been shewn that in the Adonie Talook 3,00,000 acres are available for irrigation from Statement above given it will appear that nearly as many acres can be found in the Bellary Talook 1,00,000 acres additional does not seem to be too much to expect in the Goolliem Talook and the valley of the Hundry from the map, I am inclined to consider that 8,00,000 acres of land will be brought into cultivation but I have only assumed the smaller area as the levels are not sufficiently advanced to enable me to determine exactly the line which a high level channel from the Toongabuddra will follow exactly. In a personal interview with Colonel Cotton at Bellary I received definite instructions on this subject from him and a surveyor has been sent to take the necessary levels for furnishing a detailed estimate and report.

10. In connexion with this subject we have to consider the soil and climate the soil undoubtedly is of a very inferior quality and it is not probable that it will ever bear higher Assessment than 5 Rupees an acre and that probably will not be realized for some time to come from

all I can ascertain the produce per acre in this District is only a little more than half what it is in Rajahmundry and the soil requires a great deal of manuring and preparation to make it of any value; as under the Toongabuddra channel so under the proposed channel land of superior quality will be found but I am not yet aware of the extent of such land but this would probably bear the same high Assessment which it does at present under the existing channels 12 Rupees an acre for the 1st crop and 6 for the second the climate of Bellary is generally very healthy for Europeans the greater part of the land is 14 to 15 hundred feet above the level of the sea and on the Ramanamala hills the altitude is 3,300 feet above the sea level the climate there being superior to Bangalore or the table land of Mysore, in the plains during the prevalence of the easterly winds the climate is undoubtedly feverish both to Europeans and Natives, but in other respects it is considered remarkably healthy and during the hottest season of the year such a thing as a hot night is almost unknown.

11. *Revenue.* The Collector in his letter before mentioned stated that Rupees 5 per acre on an average was likely to be realized by irrigation though he considered that many years must elapse before the land would all be taken up but if a quarter of a century were to expire before the full expected revenue of 35 lacs were obtained it is surely better worth the while to wait that time to allow the population to increase and wealth to spread over the land by establishing a system of works than to continue the present system of trivial repairs on ordinary estimates which the experience of half a century proves has done no good whatever to the country mates which the experience of half a century proves has done no good whatever to the country mates which the experience of half a century proves has done no good whatever to the country mates constantly being called for whilst the greater part of the District is almost waste and the invariable answer to every enquiry in all the villages why they do not cultivate more land is, there are no ryots, the people have all gone away.

12. The Honorable Court of Directors in their despatch No. 1356 dated 9th September para. 8 insist that the present mode of raising the Assessment when water is supplied for cultivation otherwise than by the ryot's own labor or capital be abandoned and agree entirely in the opinion expressed by Mr. J. P. Grant that the profits from the irrigation should have no connexion whatever with the Assessment of the land revenue these profits to be determined by the simple sale of the water to persons requiring it, if these arrangements are to be carried out a revenue survey of this District should at once be undertaken the land revenue fixed and the arrangements made for ascertaining exactly the quantity of water required to be supplied.

13. Probably Government are not prepared to go to the expense of a revenue survey at present the simpler proceeding perhaps would be to carry out the plan adopted in the Bombay Presidency of making the ryots mark out their fields by erecting small mounds at the corners of them this proceeding is inexpensive, and will allow an Officer bringing water to a village to ascertain at once by simple measurement the area irrigated and the water rate which should be levied on it I am inclined to think that this plan would be readily adopted by the natives as I was assured the other day that it was much approved of by them in the Darwar Collectorate where it had been carried out.

14. It is very necessary that some plan should be at once adopted for settling the land Revenue as a double guarantee will be required by any Company undertaking these works.

1st. A certain interest for capital subscribed.

2nd. No great increase of Assessment to take place immediately water is supplied.

If the plan adopted in the North-west Provinces of keeping the land Assessment entirely distinct from the water rent is carried out here it will necessitate some arrangements being made in the manner in which the latter is to be collected, the plan in the North-west Provinces is sufficient-ly simple Government obtained the money required for the construction of those works either by loan or from the Revenues of the country and their own Officials administered the affairs of the country the Revenue authorities collecting the land Assessment and the Engineer Officers levying the water rate here it is proposed to let the Company get what it can from the execution of similar works though its affairs are to be entirely without the exception under the control of the Government.

15. I would beg to say that I do not consider a Company subscribing the capital for such works can be regarded in any other light than the Government raising a loan on a fixed rate of interest and that any such Company should have nothing whatever to do with the affairs of the

country any more than the subscribers to a loan the prosperity and welfare of the people belong to the Government alone and I do not think that the affairs of any Company should be allowed to interfere with them there is no doubt that any amount of money can be obtained in England at the rate of 5 per cent and that this money laid out in this country in improving the cultivation decreasing the cost of transport by facilitating the communications will return a minimum rate of interest of 10 per cent. I think therefore that the Company if it have a guarantee of 5 per cent on its capital it can make no other claim on the Government as in the event of the works proving sufficiently remunerative to pay the interest of the capital and a fair Revenue to the Government the water rate should be reduced to a minimum as soon as possible.

16. The interests of the people require consideration as well as the interests of a Company and however beneficial to them the execution of irrigation works may be I cannot agree in the opinion that the profits of these water companies should be left entirely in their own hands such a proceeding is simply calculated to carry as much bullion as possible out of the country annually as can be obtained by a certain amount expended in it, I would therefore beg to urge that the Company be guaranteed a certain interest for their capital that irrigated lands be leased for small periods of 3 or 5 years and that after the lands pay the interest of the capital expended in the execution of the works for the repairs and maintenance of the works and a certain increase of Revenue to the Government no further demands should be made on the people.

17. *Produce.* On dry lands in this District cotton and Cholum are the Chief productions and on irrigated lands rice and sugar a comparison of the yield per acre in each case omitting sugar will assist as in estimating the benefits likely to result from the execution of a proper system of works calculated to bring a large area into cultivation.

18. In the Courts despatch above referred to para. 13 the injurious effects of artificial irrigation on the cotton crop are alluded to before entering upon the subject of the produce of the land it will be as well to dispose of this question from all I can hear the want of water for this plant is as great calamity as the abuse of it when supplied, in this District in this year there has been a great failure of the rain the consequences may be observed all over the country in the stunted condition of the plant had this been assisted by irrigation there can be no doubt the plant would be as good as it is in years of abundant rains I was assured the other day by the people of Mangala that with irrigation they could cultivate the American cotton plant but that it would not thrive in this country simply for want of water, the rain fall in this District is excessively small the average of 5 years shews it to be barely 18 inches and this plant I believe thrives only where the average rain fall is much higher.

19. It takes 5 years to prepare the land for cotton cultivation during this time it pays an Assesment of 12 annas per acre when planted with cotton it is assessed at about $2\frac{1}{2}$ Rupees per acre and yields about 2 maunds of cotton to the acre, it requires therefore 45 acres to be cultivated to produce a ton of cotton.

	Rs.
The Assesment on this at $2\frac{1}{2}$ Rupees per acre is...	112 $\frac{1}{2}$
The value of 90 maunds of cotton @ 3 Rupees a maund is...	270
Profit to the cultivator...	157 $\frac{1}{2}$

Including his expences of preparation, and cultivation &c. the land is not considered to be remunerative till the 7th year after it is first taken up or two years after it is planted with cotton.

20. A statement of a similar area cultivated with cholum will be as follows one acre of good land yields 400 seers of cholum the assessment on this is Rupees 3 an acre and the average market price is 50 seers for the Rupee but this article varies considerably in price, during the famine years it sold 15 seers for the Rupee and in years of abundant supply the people are glad to get rid of it at the rate of 100 seers for the rupee being equally valueless to the ryots in good and bad years as in the former if he cannot get rid of his produce it rots and in the latter his lands are waste and he has to buy food at ruinous prices and look to the Government for subsistence: we have then 45 acres of land cultivated with cholum

	Rs.
Assessment at 3 Rupees an acre...	135
The value of 18000 seers of cholum @ 50 seers for the Rupee ...	360
Profit to the cultivator ...	225

including his expences of cultivation in those years in which he is obliged to get rid of his produce at 100 seers for the rupee his profits are only 45 Rupees whereas his assessment is 135 Rupees or the revenue is to the profit as 3 to 1 and even in good years the proportion is as 3 to 5 for cholum and $2\frac{1}{2}$ to $3\frac{1}{2}$ in the case of cotton.

21. We will now proceed with a statement of the produce of a similar area cultivated with rice, the results which I give are derived from those obtained under the Toongabuddra channels as it present existing one acre of average land produces 750 seers of rice this sells in the market in average years @ 20 seers for the rupee the assessment we are to assume is 5 Rupees an acre hence we have for 45 acres of land, cultivated with rice as follows.

Assessment at 5 Rupees for acre 225 Rupees 33,750 seers of	
rice at 20 seers for the Rupee ...	1687 $\frac{1}{2}$ Rs.
Profit to the cultivator ...	1462 $\frac{1}{2}$

including his expences of cultivation this is calculated to be 10 Rupees an acre we may therefore fairly assume 1450 Rupees as his profit the expences of cultivation which I have put down are I believe real the land in this District requires much preparation by manuring whereas in Rajahmundry the alluvial soil there requires only to be moistened with a little water and ploughed up by one man and a couple of bullocks without any other preparation whatever.

22. From the statements above given it will appear that where as the revenue is to the produce in the cases of cotton and cholum as $2\frac{1}{2}$ to $3\frac{1}{2}$ and 3 to 5 with irrigated lands it is as 1 to $7\frac{1}{2}$ for the gross area proposed to be irrigated the results in three instances will be as follows.

	Rs.
700,000 acres of land cultivated with cotton assessed at $2\frac{1}{2}$ Rupees an acre...	17,50,000
Gross produce @ $3\frac{1}{2}$ Rupees per acre ...	24,50,000
Similar area cultivated with cholum and assessed @ 3 Rupees per acre ...	21,00,000
Gross produce @ 5 Rupees an acre ...	35,00,000
Similar area cultivated with rice assessed at 5 Rupees an acre ...	35,00,000
Gross produce @ $37\frac{1}{2}$ Rupees per acre ...	26,250,000

From this it will appear that the revenue will be benefitted 50 per cent in one case and 40 per cent in the other by substituting irrigation for dry cultivation what the benefits to the people will be are almost incalculable the area which I have assumed as being cultivated are much larger than I believe are actually cultivated with dry crops the whole land revenue of this District is not 21 lacs of Rupees which deducting some 7 lacs for irrigated lands leaves only 14 lacs as the revenue from dry cultivation derived from its whole area where as it is shown above that by irrigating a very small portion of its area for doing which there is an abundant supply of water we may at once increase the revenue to more than double its present amount.

23. In the above statements I totally omitted the consideration of the sugar cultivation which is however very extensive in this district the extent to which it may be increased depends so entirely upon the quantity of water stored in the Toongabuddra and its tributaries that it is quite impossible to guess to what extent it will be increased but as it will be quite possible for the Toongabuddra in itself to keep one of the proposed channels full all the year round I will give the result of my enquiries on this subject premising however that I am not at all satisfied with these results as I consider they are far more favorable than are generally realized.

The cost of cultivating an acre of sugar cane including the Government assessment 18 Rupees an acre is..... 138 Rs. One acre produces 192 maunds of jagery and this is now selling at one Rupee a maund hence the profit to the cultivator is 54 Rupees. This manufacture into sugar yields about 128 maunds here as in Rajahmundry in former years fully $\frac{1}{3}$ is wasted by the native manufacture, the profit to the manufacturer is said to be 4 annas a maund or 32 Rupees on the yield per acre the average price of sugar is 3 Rupees a maund or 384 Rupees for the 128 maunds deducting the price paid to the cultivator and the profit to the manufacturer @ 4 annas a maund I find the cost of manufacture is only 160 Rupees for 128 maunds whereas Colonel Cotton found this to be 180 Rs. a ton in Rajahmundry before the improvements took place, supposing similar improvements to take place, here the cost of manufacture will be only 107 Rupees but from other enquiries which I have made I find that the cost of manufacture here now is Rupees 112 $\frac{1}{2}$ per ton.

24. We have every reason for supposing that the upper channel from the Toongabudra will be easily supplied with water all the year round without there being any necessity for storing the water this channel it is calculated will irrigate 30 thousand acres of land and I believe there is no reason why the whole of this should not be cultivated with sugar or with double crop of rice this channel is totally independent of the other proposed channels except being connected with them for navigation the results therefore from it may be considered in addition to all that has been given for the other works.

25. From this channel therefore I expect the results to be as follows 30,000 acres of land cultivated with Sugar or two crop rice land at 18 Rupees an acre 5,40,000 profit to the cultivator if cultivated with Sugar @ 54 Rupees an acre 1,62,000.

do. do. cultivated with rice @ 37½ Rupees for one crop 11,25,000.

26. From what we know has taken place in Tanjore and Rajahmundry by the establishment of a system of works for bringing the land into irrigation we have every reason to believe that similar results will follow here though it is quite impossible in a country situated as this is to execute these works at the trifling cost at which they have been there executed but the position of this district though unfavorable when compared with delta districts is not by any means so unfavorable as it was first supposed to be from an examination of the records the water supply in the river is abundant for maturing one crop of rice on more than a million acres of land and sufficient water must pass through the district which if properly stored would probably mature a second crop upon half that area or nearly the area it is expected we shall be able to irrigate in this district.

27. In a personal interview with Colonel Cotton I received his approval of the proposed lines of channel I will now proceed to give an outline of the works their cost I am not able at present to state but the Survey &c. are under execution and detailed plans and estimates will be laid before you as soon as they are prepared.

28. The first Annicut is to be constructed below the Wurdah confluence at the village called Ungoor, on the right bank of the river a channel will be contoured falling 6 inches a mile to the foot of the Ramun mully Hills to discharge itself into a large drainage there in this drainage it is expected we shall be able to construct reservoirs, this channel will therefore have to be made to irrigate all the land between itself and the river bank to be navigable and to carry a body of water during the freshes to the proposed reservoir.

29. The second Annicut is to be at Wullabhappoor the channel from this will be the most difficult of execution an examination of the country has convinced me that it will be necessary to take the channel through a tunnel to keep it on a sufficiently high level to irrigate all the available land the channel after reaching Hospett will have to be tunnelled through the Darwar road for a distance of perhaps 2 miles passing then by Gadigavoor above the Darjee tank towards Bellary and the Huggry river which it is proposed to cross by an aqueduct 40 feet high it will proceed on the right bank of that river on as high a level as it is possible to attain towards the valley of the Hundry.

30. The 3rd Annicut is to be constructed at Ramsaugur a few miles above Kumply the channel from it is to be taken across the Bellary talook towards the Huggry to cross that river by an Annicut above Hoonnoor and thence to proceed towards the Chickkatoombalum tank and Kurnool to irrigate a somewhat larger area than I stated in my letter to you when first suggesting an Annicut below the confluence of the Huggry with the Toongabuddra.

31. All these channels are to be connected together to form a perfect navigation through this district from the Wurdah by the valley of Koondaur and the Pennar to the eastern coast Canal I have not yet determined the size of the locks, by your instructions these should be 150 feet long and 20 wide whereas Colonel Cotton considers they should be only 150 feet long and 10 feet wide, as exactly the same number of locks will have to be constructed to overcome the fall the dimensions stated by Colonel Cotton would appear to be the proper ones to be adopted if these do not interfere materially with the size of boats to be used on the ground Canal and I am inclined to think that it will not be found necessary even for steam navigation to make the locks much larger than those proposed by Colonel Cotton I see from a report of his that a very useful boat is now being used in the Rajahmundry channels 117 feet long 14 feet wide drawing only 16 inches of water and that her speed is 9 miles per hour and could be easily increased.

32. For the construction of the proposed work we have an abundance of materials at Ungoor good stone can be obtained close to the work within ¼ of a mile a very good kind of lime stone was found and in the island close to that place there is very good earth for bricks firewood is scarce and will have to be brought down the river from the jungles as well also the timber required for the boats and lock gates, in the Ramandroog hills we have plenty of iron.

33. For the Wullabhappoor and Ramsaugur Annicuts we have an abundant supply of stone, chunam will have to be brought from a somewhat greater distance and I would recommend that a large supply of bamboos be at once stored for making basket boats to be used in the construction of all these works.

34. Labor though not very abundant cannot be considered very dear I hope when these works are fairly taken in hand to get a sufficient supply at 2 annas a day cooly hire, our principal difficulty will be in getting good Maistries and Stone-cutters and Carpenters these it may be said do not now exist at all in this district.

35. The practicability of constructing these works has been fully established by the actual construction of the Wullabhappoor annicut, this annicut is perfect right across its branch of the river and was built under no ordinary difficulties, the old native annicut above it keeping up a constant head of 9 feet of water in the works now proposed no such difficulties will I hope be met with I should immediately on commencing these works cut the heads of the large irrigating channels a mile or so to the full width till they have arrived at the first drainage falling into the river below the site of the annicut, all the summer water could thus be taken out of the bed at once and the annicut built across on dry ground just as easily as a house is now constructed.

36. These works should I consider be undertaken as soon as the estimates are furnished, altogether, arrangements can be made for superintendence from the means we have in the District at present. The Ungoor annicut and channel I propose placing under the Sub-Engineer Chetumbarum Moodeliar, the Ramsaugur annicut and channel to be placed under Mr. Supervisor Porter and with Assistant Overseer Gray and if the late Assistant Overseer Howell could be allowed to rejoin the District I would beg to be allowed to undertake the Wullabhappoor annicut and channels.

37. The whole Department in this District will require re-construction, there are many other projects which require to be considered and carried out the Hindoopoor project has failed simply from the enormous extent of entirely waste land now given by the Collector in his returns, taken as stated by Colonel Lawford the project is perfectly feasible, the Teroomany project has been rejected on account of the water supply not being established on sufficient data and a small error in the calculations, I could have given any number of Statements made by natives regarding the water supply in the Pennair but having only the observations of one European I gave that in preference thinking it would be more relied upon, one year's experience was not sufficient to enable me to judge for myself from what I have now seen I believe the Pennair is as capable of irrigating the area stated by me as it is of not affording a drop of water in other years, the error in the calculations arose I suppose from the Doctor finding it necessary to put leeches on my head immediately after I had signed the report.

38. The Yaparaul project must be considered with reference to the large tank proposed in the Mysore territories, from the state of the river this year I am convinced if this reservoir is built, we shall not get one drop of water out of the river in years like the present one, a good deal of the land proposed to be irrigated by this work will now be provided for from the Toongabuddra and I fear that all the labor and thought bestowed on this project will be all waste as it has been with many other projects, nothing has been based upon the establishment of a proper system of works to benefit a large area of the District had the undivided attention of one Engineer Officer been directed to the Toongabuddra alone we should have had no famine roads in this District, the feasibility of the project would have been at once established and its execution would have been a mere matter of time, the cost of the works if they exceeded 3 million sterling would still be highly remuneration as shewn by the expected returns being more than 10 per cent. on that outlay.

39. We are executing works at sufficiently moderate rates in the District 1 Rupee 11 annas a cubic yard for the finest stonework in India cannot be considered dear, brickwork and archwork at one anna six pice to one anna eight pice a cubic foot, our woodwork is expensive but this could be reduced by proper superintendence, an abundance of iron can be obtained for Rupees 2 a maund.

40. We have to consider the establishing a line of navigable canals through the District and the benefits likely to arise to it from the saving in the cost of transport.

41. An observation made by the Sub-Engineer drew my attention to this and from enquiries I find the reduced cost of transport is at the rate 3½ annas a ton per mile. I find that by substituting wheeled conveyances for the common bullocks transporting grain a saving of

Rupees 25 a ton has been effected in the mere means of transport alone, not taking animal life into consideration at all. To move a ton of rice by bullocks requires an expenditure of Rupees 225 on the purchase of the animals alone, the same can be carried by bandies at an outlay of Rupees 200, by a boat carrying 100 tons and which might cost in its construction Rupees 3,000, a ton of rice could be conveyed out of the District by an outlay of Rupees 30 thus saving Rupees 170 a ton in the one case and Rupees 195 in the other to the District in the means it has now to provide for getting rid of its produce.

42. Many doubts have been thrown on the project being successful on the score that it will be a long time before all the land is taken up, a certain time must be allowed for the population to increase the project is most popular with the people, they know and feel how beneficial it will be from what they see under the existing Toongabaddra channels, all the available land which the existing population can supply will be I think at once taken up, as the cost of transport is reduced the merchants will be able to lay on their capital in the land and bring it into cultivation this is now entirely absorbed in the cost of transport, the effects of these works are more likely to take away the population from other Districts or to bring back those who are known to have left it, I do not think there will be any great difficulty in getting people to take up the land our difficulties will be I expect the same here as they were in Rajahmundry, the hatred of the Brahmins and Tahsildars to all works of improvement, any thing which shews the people what the worship of the God of truth enables us to execute is sure to be abhorred by them, all they can about is that the habit of Idolatry should not be disturbed any thing which tends to establish correct principles is certain to upset this and their consideration with the people from them therefore the works will receive no countenance or support.

43. In conclusion I beg to recapitulate what I consider has been fairly established as far as the investigation has proceeded.

1st. That the water supply is abundant.
2nd. That a very large area exists in this district which can be all irrigated and sufficiently fertile to yield a fair return for capital expended in the execution of the necessary works.

3rd. That we can establish a line of internal navigation through the District calculated to reduce the cost of transport 600 per cent and thus save many lacs to the people besides enormously increasing their produce from the land.

4th. That the works are feasible and not difficult of execution and likely to be very remunerative.

44. I cannot conclude this report without a reference to the assistance I have derived from a perusal of the papers on this subject by Colonel Lawford and Captain Walker, the former Officer's statements regarding the water supply has been fully borne out by the records which have been kept since he left the District and the latter Officers conception of an Annicut and Channels from Wullabapoor is likely to be realized with some modifications. To Lieutenant Tyrrell is due the credit of the channel from the Ramsaugur Annicut. To Mr. Supervisor Porter great credit is due for the manner in which he worked through the hills between Camlapoor and Darojee, the information he acquired at once shewed what works were required to overcome the obstacles and I beg to bring him to your notice in the hope he may receive some promotion, I have always found him most attentive and zealous in the discharge of all duties entrusted to him.

45. In conclusion I would beg that should this project be ordered for execution I may be allowed some 20 good intelligent men from the Sappers, Artillery or line to prosecute the work with, for the tunnel it may be necessary to get experienced hands from England but all the rest of the work could be at once undertaken by men supplied from our European Regiments under one or two professional Officers.

No. 35. ORDER THEREON, No. 653; dated 12th April 1858.

With this letter, the Chief Engineer lays before Government a report from the District Engineer of Bellary on the Toongabudra project under investigation by that Officer. Though it is not so stated by the Chief Engineer, this communication would appear to have been furnished by the District Engineer in consequence of the call from Government for a report on the proposal made to the Honorable Court of Directors by the Irrigation and Navigation Company. If this be the case, the Government desire that the District Engineer be directed to discontinue his levels: the report required was a general one, and it is not necessary that any detailed estimates should be made or very accurate enquiry be instituted.

2. If the levels are being taken under other orders than those above referred to, and at the instance of Colonel Arthur Cotton, the Chief Engineer will be so good as to inform the Government, more fully what he has done in the letter quoted above, before he adopts any further measures.

(Signed) H. FORBES,
Acting Secretary to Government.

Central Office of P.W.
No. 7702 Fort St. George 27 February 1858
From The Chief Engineer
To The Secretary to Government
P.W. Department
"Public" Irrigation.

Sir, In continuation of my letter No. 7590 dated 21 February 1858. I have the honor to forward for submission to Government, the preliminary General Report received from the District Engineer of Bellary on the Toongabudra Project now under investigation by that Officer, together with a Statement of the Height of water in the Toombuddra at the Wallabhapoor Ferry during the last 12 Years, with a Return shewing quantity of rain fall at the Cusbah station of each Salook in the Bellary Salook since the Year 1852.

2. The Government will not fail to notice that the further elaboration of the details of the whole scheme is being mistakenly pursued by the District Engineer and many of the Departmental skilled Subordinates. I trust to

he O

be speedily authorized to instruct Lieut
Fishers that the Government have
dispensed with any further detailed
investigation of the Project, and
that the series of Levels may be at
once laid aside.

I have the honor to be

Sir

Your most Obedt Servant

Central Office of R.R.

Fort George

Wm. H. Colwell

27 February 1838

Chief Engineer

W.H.C.

it is not so stated by
the Chief Engineer, this
communication would
appear to have been
furnished by the
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made or very accu-
rate enquiry be
instituted.

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2. If the lease are
being taken under
other orders than those
above referred to,
and at the instance
of those at the
Cotton, the Cf. Enr.
will be so good as to
inform the Govt. and
fully that he has done
in the letter ^{suggested} above,
before he adopts any
further measures.

9. Copy to the Chief Engr.
P. 134
Recd. 3 Orig. Enr. 10-5-58

From the 6th Aug 1858 to 24th
Feb 1859 1800 to 394 m. 18th May

Public Works 1858 to 1859
24th to 18th April

Copy in a L. to G.
27th May 1858 at 10

No. 653
Exp. the 18th of June.
2nd 18th April 1858

No. 244835

Calculating that the 18th of June
required in the Long planks
project under investigation
by the District Engineer of
Colony, was a general one
and it is not necessary that
any detailed estimate should
be made or very accurate
enquiry be instituted.

21st April 1858