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REPORT
OF
A TOUR OF PROFESSIONAL INSPECTION

THE MADRAS PRESIDENCY

1856

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REPORT

OF

A TOUR OF PROFESSIONAL INSPECTION

OF

THE NORTHERN LITTORAL DISTRICTS

OF

THE MADRAS PRESIDENCY,

MADE BY

LIEUTENANT COLONEL F. C. COTTON,

SUPERINTENDING ENGINEER, NORTHERN CIRCLE;

WITH OBSERVATIONS THEREON

BY

COLONEL C. E. FABER,

CHIEF ENGINEER D. P. W.

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MADRAS:

PRINTED AND PUBLISHED BY H. SMITH AT THE FORT SAINT GEORGE GAZETTE PRESS.
1856.

M E N D I N G S L I P

Author : C. E. FABER

Title : Report of a tour of professional inspection

Edition : Year of Publication: 1856

Preliminary Pages: 1 to 2 = 2

Main Book : 1 to 47 = 47

Supplementary pages : to =

Total Pages = 49

25 sheets

Missing Pages : =

Net No. of Pages = 49 25 sheets

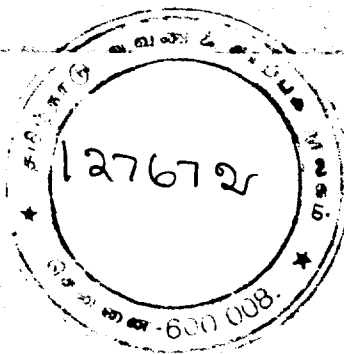
Date sent for Mending:

Initials of the Library Asst.

Mended by :

Checked by :

Date of Return:



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* கொள்ளப்பட்ட

* மார்ச் மாதம் வருடம் 1988

* செப்பனிட முடிந்த

* மேன் மாதம் வருடம் 1988

* ஒராய்ச்சி தயாரிப்பு

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CENTRAL OFFICE OF D. P. W.,
FORT ST. GEORGE,
22nd August 1856.

FROM COLONEL C. E. FABER,
Chief Engineer.
To J. D. BOURDILLON, Esq.,
Secretary to Government, D. P. W.

SIR,

Under the orders of Government contained in Extract Minutes Consultation, No. 201, dated the 12th February last, Lieutenant Colonel F. C. Cotton, Superintending Engineer Northern Circle of Public Works proceeded on a tour of professional inspection of the Northern littoral Districts of the Madras Presidency, and quitting the Central office on the 28th February, he returned to Madras by the Calcutta Steamer of the 22d of May.

2. Embarking from Madras on a trading vessel of 500 tons, he reached Munsoorcottah or Gopalpore (as the open road-stead is indifferently designated) on the 3rd March. Lieutenant

(Para. 1.) Colonel Cotton next proceeded north to the Collector's station of Chetturpore in Ganjam, and after an interview with Mr. Knox, he made a palankeen journey to Chicacole, in order to meet the Civil Engineer and his 1st Assistant Lieutenant Harington, 2d Madras European Light Infantry. During the detention of the latter Officers on duty in that neighbourhood, the Superintending Engineer crossed the Vizagapatam frontier and visited the port of Binalipatam, which he examined, and the two adjacent Chittivalsah bridges, whence retracing his steps via the Kuinada Light House to Chicacole, he accomplished a very interesting inspection of the port of Calingapatam and its approaches. Lieutenant Colonel F. C. Cotton proceeded in the next place by one of the new lines of road under the able construction of Lieutenant Phillips, (5th Regiment Native Infantry) to Purla Kimerly, accompanied by Major Birdwood and Lieutenant Harington, and falling back on the Trunk road No. 6 by a second cross Jage from Purla Kimerly to Tekally, he thence made his way by the small but busy ports of Pandu and Somarpoorpatta to the large and important town of Berhampore. The Superintending Engineer again quitting the Trunk road No. 6 at this point, struck off due north by the new road

to Aska, and after commenting on the incompetency of Lieutenant McQuoid (13th Regiment Native Infantry) late of the Department Public Works, he continued his route to Russelcondah, in order to report on the alternative line projected by Lieutenant Harington. Lieutenant Colonel F. Cotton then returned via Aska to Chitturpore, where, through the effects of an accident by which he had been thrown from his horse near Chicacole, he was confined to his room for a considerable period under Medical treatment, and finally proceeding to the Chilka lake, he embarked from its port at Rumbah, and joining the high road to Calcutta through Cuttack and Orissa, he reached the Metropolis of India just in time to secure his return to Madras by the second Mail Steamer of May last.

3. Unfortunately the only date that has been given is that of first landing in the District of Ganjam at Gopalpore, and thus the amount of time occupied in making examinations which nearly in all cases have led to very interesting observations and important suggestions, is not known. In the latter part of May it was understood, that the Superintending Engineer Northern Division was to be employed as Mint Master, during Major Bell's absence at Calcutta, and it became necessary even before it had been regularly resumed to dispence with his atten-

dance at the Central office in order that the impending transfer might be facilitated, Lieutenant Colonel Cotton was placed in charge of the Madras Mint on the 10th June, and it was not until the 12th Ultimo that the report of his tour of inspection in March and April, was completed for delivery.

4. If however there be just cause of regret, that the report has not been presented at an earlier period, there is on the other hand good cause I think to feel satisfied with the beneficial effects of professional inspection, by an intelligent and experienced Officer of Engineers, whose special business it has been to direct attention to the sources of improvement detected during his inspections and to offer such suggestions as a practised judgment deems suitable for developing the capabilities of the countries he examines. The "Journal" as Lieutenant Colonel F. Cotton, somewhat mistakenly terms it, which I have now the honor to lay before you, deviates not a little from the common track usually followed in such compositions, and instead of being confined to an account of each particular work, seen and examined, it will be found that with a breadth of handling seldom met with in Official papers, Lieutenant Colonel Cotton deals vigorously with every subject that comes before him, and that he bestows no slight or superficial consideration on topics, which, from a Superintending Engineer on a tour of duty may perhaps be thought extra-professional. In my own humble judgment it is however both the topics which he has selected for enquiry, and the freedom with which he discusses them, that constitute a chief and valuable feature of his interesting though somewhat voluminous paper.

5. Reaching me at a season of the year, as Lieutenant Colonel Cotton's paper has done, when my own time and attention, (and those of the Establishment) were much occupied in the periodical Reports of 1855-56. I was induced by an anxious wish to place the Government in early possession of the Superintending Engineer's Report to forward it to you* without any detailed review on my own part; thinking moreover that most of the suggestions of the Inspecting Officer could not fail to commend themselves on their own merits to the favourable consideration of Government. It however is doubtless desirable that in this case also the usual course of submitting the detailed opinions of the Officer in charge of the Department should not be departed from, and in conformity with the instructions contained in the Extract Minutes Consultation No. 1274 of the 26th Ultimo. I shall now proceed to epitomize the Superintending Engineer's labours.

Munsoorcottah or Gopalpore harbour—Ganjam District.

6. The first subject treated of in the Report is the state of the Munsoorcottah or Gopalpore harbour, and the constantly increasing deterioration of its anchorage from the discharge of ballast in the roadstead, a practice expressly prohibited by the regulations of the port, but persisted in, through want of adequate establishment to enforce compliance. Considering the unsafe state of the Ganjam roadstead at all times, this dangerous practice is fraught with serious mischief to the shipping, and every possible measure should be taken to arrest this growing evil. For the improvement of the Port itself, the Superintending Engineer suggests that Screw moorings be laid down by the Government in various places; that the Custom House and harbour Establishments should be made effective; and that means of communicating with the shipping by signals should be also provided at the expense of Government. These suggestions appear to me worthy of adoption.

7. After remarking on the approaches to Munsoorcottah from the interior and from the north (on which it is gratifying to find that the trade is rapidly increasing, and that the cost of transit has been much reduced already) the Superintending Engineer notices the Chicacole bridge which at the time of his visit was being built under the superintendence of Lieutenant Palmer, (1st Regiment Native Infantry.) This work was then well advanced; and having been opened for general traffic on the 26th Ultimo, the Public are now in possession of a permanent communication over the river Nagolia, which often was unpassable even to the ferry boats at the old ford. From Chicacole, the Superintending Engineer visited the head of the Doosy channel about to be provided with a regulating head sluice; and also the Palcondah road now under execution under the superintendence of Lieutenant Magnay, (38th Regiment Native Infantry.) The progress

made under this Officer's management is reported to be very satisfactory and it is believed that this important road will be completed in the course of the present year, adding greatly to the facilities of communication between the people of the Hill country and the inhabitants of the large towns and thus contributing to the social improvement of the former, and the pecuniary prosperity of the latter.

Vizagapatam District—Bimlipatam River.

8. The next subject remarked upon is the Bimlipatam river, described as navigable at high water by laden boats, during even the dry season. A few cursory observations on the practicability of improving the mouth of this river, are offered; but as not founded upon any definite basis, it seems unnecessary to dwell on them. The occurrence of sandy and other deposits at the mouths of Indian rivers is however one of great importance, and deserving of careful investigation, I shall not fail therefore hereafter when Lieutenant Colonel Cotton's Report has passed through the Government Press, to draw the attention of the Civil Engineers of the Coast Districts to this topic, with the view of obtaining a collection of well authenticated facts, in the hope of deducing from them some general results and the law governing the formation and some general system for the timely removal of such deposits.

Chittivulsa Bridges.

9. With regard to the Chittivulsa bridges, one of which is now a total ruin, and the other only partially injured, the Superintending Engineer recommends that the road-way over the latter should be immediately removed, and that fluid mortar or grout be pouted into the existing cracks of the arches. This measure he believes will arrest the further dilapidation of the structure, and I certainly recommend its adoption.* But here, as in other parts of the Report, it is obvious that prompt action was essential to the practical utility of the suggestions, and that unless authoritative instructions were given to the local Officers at the time of inspection, or shortly afterwards, the recommendations might as well have been withheld altogether. The ruined bridge, the Lieutenant Colonel thinks, ought to be restored, and to have an increased water way, with its southern approach for about 150 yards made so low that the surplus might pass over it in case of the water way being still found insufficient during the highest floods.

Kunnada Light House.

10. The Superintending Engineer Northern Circle of Public Works also recommends that more burners should be added to the present apparatus in the Kunnada Light House which in consequence of defective intensity of light is not visible at a greater distance than 10 miles; whereas from its elevation of 150 feet above the level of the sea there ought to be a command of 15 miles* from the deck of a ship, and of a still greater distance from the mast head. I entirely concur in Lieut. Colonel Cotton's opinion.

Calingapatam Port—Ganjam District.

11. Paras. 19 to 26 of the report are devoted to a consideration of the improvements thought necessary for the Port of Calingapatam. This town is situated at the mouth of a river of the same name, and although its exports are valued at from 4 to 5 lacs of Rupees per annum, the land approaches to it are all but impracticable. The Superintending Engineer notices at length the state of the road between the town and Chicacole and the difficulties of a traffic experienced on it and he strongly recommends that it should be immediately put in repair with an addition to its width and a much heavier coat of gravel. These improvements appear to me necessary and if approved of by Government, instructions shall be despatched for their immediate commencement. For the permanent relief of the traffic however, Lieutenant Colonel Cotton considers that three Canals should be excavated; one from Chicacole, beginning on some part of the Nagolia, another from Narsipettah which is the place of residence of the most thriving merchants trading with Calingapatam, and the third from the Nowpada salt pans 20 miles north of the Port. But these projects require further examination before any definite judgment can be formed on them, and Major Birdwood has been instructed to undertake the enquiry on this as well as on some other points connected with the improvement of the port.

12. From Chicacole the Superintending Engineer proceeded northwards, and visited the following roads and works : viz.

1st Road from Chicacole to Kimeddy. This is now being constructed under the superintendence of Lieutenant Phillips, (5th Regiment Native Infantry) in a highly satisfactory manner. Lieutenant Colonel Cotton states that a serious error has been committed in the estimate for the Kimeddy bridge, the work of which is consequently delayed pending the preparation of revised valuations. In connection with this subject, the Superintending Engineer also notices the great want of roads in the Kimeddy Zemindary now under Government management and he strongly recommends that no time should be lost in opening up communications through it to the Jeypoor country, the public works of the estate being for this purpose placed specially and entirely under the control of the Civil Engineer, instead of the revenue authorities.

2nd. Road from Suntoshapoorum to Itchapoor. An estimate of 46,550 Rupees has been included in List No. 1 of the Budget for the construction of an entirely new road between these places, but Lieutenant Colonel Cotton thinks that the old line ought not to be deserted, as the new trace is very little shorter than the old, and will cross the Mahundra river where it is separated into two branches, besides being more unhealthy and subject to other disadvantages. The Superintending Engineer has therefore directed the Civil Engineer to re-consider the propriety of the proposed divarication, as well as other points such as the traffic on the road, &c., and to submit revised measures for the improvement of the present line. But I must beg leave to observe that I do not entirely symbolize with the opinions advocated by Lieutenant Colonel Cotton on this matter in the 36th para. of his report; and it is the only topic on which he has treated, wherein I do entirely differ from him. The Superintending Engineer questions the utility of working up to the 1st class standard, that portion of the Trunk road No. 6 which lies between Suntoshapoorum and Itchapoor on the ground of less degree of traffic than on other portions (which he takes repeated occasion to state have never been reformed, mettaled, or bridged sooner, than the state of the District and its trade demanded.) He suggests therefore that it would be better and wiser to leave the section of the Trunk road now under consideration imperfect and as second class instead of first. But I am very averse to break in upon the uniformity of standard which I think should distinguish so fine and important a continuous Trunk road as No. 6, forming the direct land communication between Madras and the metropolis of India and having a probable length in our own territories from Madras to the Bengal frontier of Cuttack of 686½ miles, I think that with Road Officers and Overseers and the whole Executive apparatus requisite to take up the Suntoshapoorum and Itchapoor section in its turn, it would form a reasonable source of regret, were this part to be placed on a less favourable footing than the rest of the line, and to be left without metalling or bridges so as to be passable only during the fine season. Even on postal grounds, I think such a decision should be deprecated and as Lieutenant Colonel Baker states in his despatch of the 11th July No. 3173 that the sanction of the Honorable Court has been applied for, I hope that in this one particular, Lieutenant Colonel Cotton's opinion may be overruled in regard to the *standard* of work, though not in an adherence to the former trace which seems preferable to the new : and

3rd. Between Cunchilly and Itchapoor, three fine bridges under construction were inspected, and great praise is awarded to Overseer Hopkins for the efficient manner in which the work has been done.

13. Visiting the ports of Poondy and Sonapoorpettah in the course of the journey just mentioned, and noticing the want of good land approaches to them, and the utter insufficiency of the Custom House Establishments now maintained, the Superintending Engineer proceeds to detail the result of his inspection of the road from Itchapoor to Berhampore, which is a highly important commercial town, besides being the Cantonment of a Regiment of Native Infantry. The orders of Government have already been communicated in *Extract Minutes Consultation* No. 1419 of the 15th Instant, respecting the Superintending Engineer's recommendation for the line of Trunk road No. 6 to be led around the town, instead of through its mainstreet; and I need not therefore recapitulate in this place his reasons for supporting Lieutenant Harington's proposal to take the road outside.

14. The road from Berhampore to Aska has a very thin coating of metal which the Superintending Engineer believes will not stand the trial it will be subjected to during the rains, from the clumsy nature of the carts used in that part of the country. He recommends that the road should be kept in good order, and he hopes that the increased produce which will be brought on it for shipment, by the encouragement of the Aska Sugar Manufactory and the export duties levied on them will go far towards repayment of the expense of keeping it in repair.

15. The Injilly and Aska bridges, which are situated on the above line, are reported not to have made that progress under the management of Lieutenant McQuoid which they ought to have done. This is attributed to the inexperience and natural professional inaptitude of that Officer, who had further had to contend against many difficulties. The sums required to complete the above bridges are estimated at 8,000 Rupees for the Injilly, and 16,600 Rupees for the Aska bridge, but a part of the latter sum is due to the change of its site, which was made for important reasons, having particular reference to the convenience of the Aska manufactory. This factory Lieutenant Colonel Cotton shews will gain an advantage amounting annually to the cost of transporting 8,000 tons of Sugar 3 miles or nearly 15,000 Rupees equivalent to a capital of three lacs of Rupees at 5 per cent. Interest, but the profit will not be wholly that of the company, but be shared in by all concerned; and as the chief delivery at the factory consists of raw materials brought by the ryots, the profit is even more direct to the cultivators, than to the owners of the sugar works.

16. Lieutenant Colonel Cotton takes occasion in this part of his report, to indulge in a few observations regarding the manufacture of sugar and the profits derived from its cultivation, and he shews that it will be to the interests of Government to encourage the growth of sugar-cane as much as possible. Though the Aska factory is capable of turning out more than 12,000 tons of sugar annually, yet owing to the difficulty of obtaining an adequate supply of the syrup (goor) no more than 4,500 tons of sugar have yet been manufactured, the raw material for which, is procured from an area of three or four thousand acres whilst the entire district affords facilities for its almost unbounded cultivation.

17. The Superintending Engineer states that the profits from the sugar trade are sufficient to induce even Europeans to enter into the speculation, but that owing to the want of capital on the part of the ryots, and to the high interest which they have to pay upon loans for cultivation, or for making good the Government revenue before the crop is sold, the net actual profit realized is not better than that from rice. Under these circumstances he thinks that Government might and as landlords ought to afford assistance which can be done in two ways; first by the construction of irrigation works which will secure throughout the year a certain and abundant supply of water for cane land, and secondly by taking the revenue for the land *after* the crop is sold, holding the land as security.

18. Under the first head, Lieutenant Colonel Cotton recommends the construction of anicuts on the larger streams, and of tanks on the smaller tributaries so arranged, that when the former fail, the tank water may be thrown into the channels, and thus a constant supply be kept up. Before however, such a system of works can be undertaken, it will be necessary to have a proper revenue *survey* of the district, in order that Government may derive a fair return for its money laid out; for at present there prevails such profound ignorance on every point connected with the extent of land cultivated, its capability, average out-turn, or the value of its produce, that just now it is impossible to say even after the expenditure of a large sum upon any irrigation work, whether the Government revenue will be in any degree benefited? Such a state of things must obviously retard the material improvement of the country, and it much behoves the Government through its revenue Officers to see that steps are immediately taken for the proper admeasurement and classification of land, so that the monetary results of any improvement effected in them may be readily and correctly foreseen and determined.

19. With reference to the second way in which the Superintending Engineer thinks that Government assistance might be afforded to the growth of sugar-cane, viz. by the collection of the revenue *after* the crop is sold, I feel much hesitation in offering an opinion; for although

the return from sugar is large enough to warrant a belief that no difficulty would be experienced in realizing the revenue, yet it appears to me that the measure suggested is opposed to existing regulations, which regard not only the *land* but the *crop* as security for revenue; and that cases might occur where loss to the State would accrue. This part of the subject however is one on which it is the function of the Revenue authorities rather than of the Department Public Works, to report their views to the Government.

"Embankment of Rivers."

20. Lieutenant Colonel F. C. Cotton in para. 61 gives an unqualified opinion regarding the safety and advantage of artificial dykes to the Ganjam rivers, as ensuring freedom from the disastrous effects of inundation; and with so great a fall as 4 feet per mile, and an unobstructed out-fall to the ocean at Ganjam, I must state that I fully agree with the experienced officer, whose opinion is the better timed, because in the 12th para. of the Despatch No. 3173 from the Government of India, dated only one day before Lieutenant Colonel Cotton's Report, the wisdom and even safety of embanking the smaller Mahanuddee is so seriously questioned, that the sanction of the Government of India to the measure is for the present altogether withheld.

21. After he had inspected the river embankments at Aska, which had made considerable progress, and had indeed been partially completed, the Superintending Engineer proceeded to Russelcondah. The road between these towns is flanked the whole way, on the right or eastern side by the Rushekooliah river, and at about six miles from Russelcondah, it crosses the little Mahanuddee; the present road from this point lying interfluvial tongue between the latter and the Rushekooliah. The Superintending Engineer does not approve of this line in the fork above mentioned, as being liable to inundation; and he gives a decided preference to the alternative trace suggested by Lieutenant Harrington. Lieutenant Colonel F. C. Cotton, however does not consider that the work already done will be lost; for the road in the dry season will be a great convenience to the inhabitants of the space between the rivers, and he states that it will form when the embankments are made, an excellent approach to Russelcondah for the ryots with their produce, even without being metalled.

22. The next subject which the Superintending Engineer considers, and which is of sufficient importance to deserve mention, is the curious fresh water lake near Chutterpore; which extends inland along the coast for a distance of about 3 miles: and having a surface 10 feet above the highest sea level, possesses no channel of efflux or delivery. Lieutenant Colonel Cotton propose to lead a canal from Munsoorcottah through this lake for the purpose both of cheapening transit, and of relieving the northern Trunk road of a portion of the heavy and increasing traffic that now passes between the Chilka lake and the above port, and which threatens indeed to speedily become more than the road can sustain. But the details of this apparently promising project, have not yet been fully investigated, and must therefore be separately submitted hereafter by Major Birdwood.

Trunk Road, No. 6.

23. As regard the state of the Trunk road No. 6, the Superintending Engineer observes, that it is in very good order from Berhampore as far as the Ganjam river; but that for the portion of it between Chutterpore and Ganjam, it is very bad; and a considerable number of small bridges are still required. That part from Ganjam to Rhumbah near the south end of the Chilka lake, is now being made; but the remaining section from Rhumbah to the frontier of the Bengal Presidency a distance of 13 miles is in a wretched state.

24. Paras. 72 to 87 are devoted to an interesting account of the Chilka lake, a large body of water partly occupying the Ganjam District, but lying mostly within the province of Cuttack and according to a map obligingly furnished by the Deputy Surveyor General of India, being 43 miles in length from north to south, 13 miles in width in the broadest part, it covers an area of 367 square miles, exclusive of the intersected strip lying between it and the sea. The traffic upon the lake appears to be very brisk and indeed considerable, although there are only two landing places on the Ganjam coast; and the boats used are of the rudest description and

flat-bottomed to suit the great shallowness of the water at the borders. The rates of carriage however are very moderate, being about $3\frac{1}{2}$ annas a ton for 50 miles, or less than one pie per ton per mile.

25. Lieutenant Colonel Cotton institutes a comparison between the Chilka lake and that of Colair in the Rajahmundry and Masulipatam Districts, and he shows that like the latter, the former might be converted into a fresh water reservoir without any difficulty; the bed being made available for the cultivation of rice or sugar to the great advantage of the state and of the people, or if, instead of improving it in this way, it be thought more desirable to convert it into a place of shelter for sea going vessels, he states that this also might be done, simply by removing the present sea outlet from the northern extremity of the lake, to about 12 or 13 miles south, as shewn in his sketch map now forwarded. This alteration would permit the ocean tide to reach all those parts of the lake which it does not now affect; and thus ensure and preserve a powerful scour through the opening, which in course of time might thereby be deepened sufficiently to admit ships of large size to enter the lagoon, as in the tidal and fresh water basin at Cochin. As the Lieutenant Colonel has rather made a hasty sketch of what have struck his practical judgment as the obvious capabilities of this great inland lagoon than brought forward any definite proposal, it is not necessary for me to say more on the present occasion than that the Superintending Engineer appears to me to be borne out in each of his suggestions by the respective parallel cases of Colair and of Cochin, and that after the views of Government shall have been expressed, the attention of the Civil Engineer Major Birdwood may be very profitably directed towards, giving a practical shape to the Superintending Engineer's proposals.

26. Lieutenant Colonel Cotton next proceeds to state, that owing to the total absence of all means of carrying the produce of Orissa from the interior to its own coast (although there would appear to be a most eligible port for it at Dumrah in the delta of the great Mahanuddee) the traffic of that District is now turned south towards the ports of Ganjam and Munsoorcottah, and that he believed therefore, that if a canal were cut from the Chilka lake to those ports, the trade would be still further increased. Lieutenant Colonel Cotton with his accustomed fertility of design, accordingly advises that such a work should be undertaken as soon as possible, a light toll being levied for the reimbursement of the Government expenses. I consider this project to be quite practicable, and so useful and well calculated to improve the prosperity of the District that with the permission of Government, instructions will be sent to Major Birdwood for including an estimate for the Chilka and Munsoorcottah canal, in the Budget for the ensuing year 1857-58.

27. As connected with the subject of communication and as affording great facilities for reducing the cost of carriage from the interior to the sea and vice versa, the Superintending Engineer devotes a considerable portion of his report to the discussion of some important questions relating to the salt trade of Ganjam, these are contained in paras 88 to 112, and are well worthy of perusal.

28. He shews that although the area of the country supplied with salt from Ganjam is about three times that dependant upon Canara on the western coast, yet that the sale in Ganjam scarcely equals that of the latter place. This the Superintending Engineer thinks is to be attributed rather to the great cost of carriage than to the amount of Government duty, which only affects the sale in a very slight degree, since it is estimated, that the Monopoly in price is in the first 45 miles doubled by the cost of carriage, whilst much of the salt has to be conveyed to a distance of even fully 300 miles. There are also other impediments which Lieutenant Colonel Cotton enumerates to the extensive sale of salt. The Depôts are close to the places of manufacture, and however inaccessible these may be, the approaches to them are as yet unimproved—the quantity manufactured is so small as not to afford a surplus for bad seasons, in consequence of which, the consumers are then forced to pay a famine—price the quality of the salt offered for sale is sometimes not fit for distant carriage, and no effort is made to economize the time of those who come from the interior to purchase it.

29. For the removal of these hindrances, the following suggestions are offered. First the improvement of the communications, by means of Canals, or good cart roads; and the removal of

the salt Depôts to the termini of these improved communications. These two measures will obviously remove some of the evils complained of, and will have the effect of reducing the cost of transport, not only by the good quality of the roads traversed, but by the facilities afforded for a *return* load, the advantage of which, Lieutenant Colonel Cotton estimates at a saving of 4 pice per ton per mile, which is greater than what could be gained by a change from a good common road to the cheapest railway. Again, by the constant interchange of return loads from the coast to the interior, and from the interior to the coast, the cost of carriage will be reduced to its minimum, and the sale of salt increased to its maximum, thus benefiting both the public and the revenue; hence therefore it is proposed, that there should be Depôts of salt at all the ports, and that eventually none should be kept either in the swamps where it is now manufactured, or in any stores distant from the main lines of trade.

30. The next suggestion for improving the salt trade is the formation of Depôts at the foot of the passes leading to the hill country. This measure is proposed chiefly for the benefit of the Brinjarries, who are the only carriers of salt beyond the Ganjam frontier, and who suffer great inconveniences at present by the want of forage for their bullocks in the low country, which makes them very reluctant to leave the vicinity of the hills. As the opening of roads from the ports to the hill country has already been commenced in Ganjam, the Superintending Engineer observes, that salt might even now be stored in several places, if Government undertook the carriage of it so far. This however it must be observed, will be but a temporary measure, for as the communications into the interior advance, the present mode of transport by bullocks will gradually be superseded by the introduction and use of carts, and thus the maintenance of stores at the foot of the passes will hereafter become a matter of secondary importance, and it is to be considered as merely a temporary assistance.

31. The last suggestion which Lieutenant Colonel Cotton offers for improving the salt trade is, the appointment of a Superintendent or Agent to look after its concerns exclusively. This subject, I have been given to understand, has already been considered by Government in the Revenue Department, and that proposals have been submitted to the Government of India for the appointment of Superintendents generally in all the salt Districts. Under these circumstances, it is needless for me to pursue this branch of the subject further at present.

32. Having now examined, however imperfectly the several observations and propositions contained in Lieutenant Colonel Cotton's interesting record of his late tour, I would finally beg leave to observe that, on reviewing all that has been brought forward, one cannot but be struck with the great capabilities of the Ganjam District, as far exceeding those of the Madras Presidency in general. Thus Ganjam has a good soil abundance of rain, rivers carrying water for six or seven months in the year. Sea ports capable of improvement and great facilities for the unbounded production of salt and sugar, yet all these natural advantages are to a certain extent foregone or neutralized by the want of communications to the countries lying immediately west of the District, which must be regarded as the chief market, for its local products. These communications will be moreover useful in their unquestionable effects on the character of the people of the bordering country, and will tend to give security of life and property to the inhabitants of the frontier talooks; they will also prove an effective auxiliary in the suppression of the brutal custom of the Khond tribes and of those out-breaks in the hills, which our Police and even our troops find it difficult to quell.

33. The roads most urgently required are stated to be, one or two, at the head of the Palcondah valley in Vizagapatam, one, in the Kimeddy State above Butchley, one, north west of Kimeddy and two from Russelcondah; for the construction of one of which viz., the Cominghy line. Lieutenant McNeill the Meriah agent, has already offered his valuable assistance, and for which in Extract Minutes Consultation No. 1212, under date 19th July 1856, the Government have already authorized an advance of Rupees 7,000. The whole of the above lines appear to me to be judiciously selected, and on correct principles. For the regular and efficient construction of these hill-roads, Lieutenant Colonel Cotton proposes that a corps of coolies should be formed consisting of 500 men, for

the Government talooks and of 300 for the Kimeddy state. Considering the unhealthy condition of the passes for the greater portion of the year and also the difficulty of obtaining free and voluntary labor under such circumstances, I am quite disposed to agree with the superintending Engineer in opinion, that this is the only effectual means of getting the works speedily done, although

* No. 1341 dated 4th August 1856. the measure, as a general scheme, may elsewhere have been tried and condemned. Special circumstances need special expedients, and the late order* of Government to employ a Company of the Madras Sappers and Miners is calculated to render Lieutenant Colonel Cotton's gang of Stipendiary Pioneers certain of success, since the most useful and skilled direction can now be given to their labors by the example and instructions of the trained Sappers. But I quite concur in the opinion that for unity of control, and for a skilful employment of the men, it is essential that the present Civil Engineer and his Department rather than the revenue authorities should be charged with the entire management of the hired bodies of coolies and with the company of Sappers, and I am anxious therefore to add my own earnest recommendation on this subject to that of Lieutenant Colonel F. Cotton.

34. For the maintenance and repair of the roads that may thus be formed Lieutenant Colonel Cotton thinks that the necessary funds should be provided rather by a duty on exports than by a toll on the roads themselves; for the pressure of the latter would fall upon the carriers, who are of a poor class, and have no money; while in the former case, it would be paid by the Merchants, to whom it must be a matter of comparative indifference, whether they contribute towards the making of the roads by an increase in the cost of carriage, or by an additional export duty, but this is hardly a topic for the consideration of an Engineer.

35. Finally in his last paragraph Lieutenant Colonel Cotton adverts to the proposed division of the District for Executive purposes; but this is a subject to be considered hereafter as part of the general arrangements affecting all the Districts, and as not having relation to Ganjam only, it would only encumber a review which however cursory, has already reached an undesirable length, were I to examine the proposed Executive ranges now; and this the rather that a separate application to Government for transferring the entire Executive of the Ganjam District from the Revenue authorities to the D. P. W. has already been prepared for despatch.

36. In conclusion I would offer my respectful opinion, of the exceeding advantage which the Officers of the D. P. W. in the Ganjam and Vizagapatam Districts cannot but derive, from the careful study of the highly suggestive report now laid before Government, and I would even venture to believe, that the Revenue authorities now administering the affairs of those fine and undeveloped Provinces, may also participate in the benefit which a consideration of the Superintending Engineer's observations cannot fail to produce.

Central Office of P. W.
Fort Saint George,
22nd August 1856. }

I have &c.,
(Signed) C. E. FABER, Colonel,
Chief Engineer.

FORT ST. GEORGE,
12th July 1856.

FROM LIEUTENANT-COLONEL F. C. COTTON,
Deputy Chief Engineer.

TO COLONEL C. E. FABER,
Chief Engineer.

SIR,

I do myself the honor to forward my observations on the Ganjam District, during my late tour in that Collectorate; I am ashamed to have detained them so long, and to forward them now in so crude a state, but I find it impossible with my present duties at the Mint, to condense them as I ought.

2. I have given in the course of these observations, an account of my tour, which was not quite so complete in the northern part of the District as I could have wished in consequence of a fall with my horse having confined me to my room.

3. The result of my tour is a conviction, that Ganjam is naturally one of the most highly favored Districts in the Presidency, and especially suited to the growth of sugar, which might become the great staple of the country, if works of irrigation suitable to the culture of the cane were constructed by Government.

4. Convinced that the most profitable crop that can be grown in Ganjam is sugar-cane, I have recommended the Civil Engineer to construct his irrigation works to suit that cultivation.

Munsoorcottah	vide para. 1 to 11
Calingapatam	do. 19 to 27
Poonandy	do. 37 & 38
Soomoorpettah	do. 40

5. I have noticed the condition of the Ports, and the advisability of placing them under better management, both as to their Harbour supervision, and the collection of customs. Many more approaches are required to the Ports, though some are already under construction.

Chicacole to Palcondah	vide para. 14	ed and reported upon
do. to Calingapatam	do. do. 21	all parts of the north
do. to Sanlaspore	do. do. 28	road within the limits
do. to Kimeddy	do. do. 29	of Ganjam; and given
Kimeddy to Tichelly	do. do. 32	an account of the
Tichelly to Sanlaspore	do. do. 36	several roads leading
From Russelcondah Munsoorcotta to Aska by Berhampore	do. do. 42	to Chicacole, as well as
Berhampore to Aska	do. do. 44	of the road from Mun-
Aska to Russelcondah	do. do. 60	
Berhampore to Rumbah	do. do. 70 and 71	

soorcottah through Berhampore and Aska to Russelcondah.

7. Some observations will be found upon the Injilly and Aska bridges, the construction of which have been delayed, owing to the estimates having been exceeded.

8. When at Aska, I had an opportunity of seeing the great necessity for embanking the rivers of that part of Ganjam, and satisfying myself that no evil would result from that measure.

9. At Chutterpore, I have visited and seen (as well as my lameness permitted) the small lake there, and have supported a suggestion, made by Major Birdwood that a canal should be led from the Ganjam river (the Aska river or little Mahaunadee) to Munsoorcottah, through that piece of water.

10. I have also recommended a canal being immediately cut from the Chilka lake to the Ganjam river, for which there are great facilities.

11. After an inspection of some portion of the Chilka lake, I have given my opinion as to the means by which it might either be reclaimed and cultivated; or converted into a harbour.

12. Considering that amongst the most conspicuous wants of Ganjam are roads from the sea ports to the hills, and through that wild tract of country into Bustor; I have suggested the formation of corps of coolies in the Government talooks and in Kimeddy.

13. The salt trade of Ganjam having a most important effect upon the cost of carriage on goods brought to the coast from the interior, I have offered some remarks upon the existing impediments to its sale; and suggested that every means should be employed to increase the quantity sold, not only to secure by means of it a return for the money spent upon the roads and passes, but to reduce the cost of carriage upon them when made; and to confer a boon upon the whole population of the interior who are now very insufficiently supplied with salt.

14. In all that I have written, I must be understood to have made my suggestions in concert with Major Birdwood, who was with me in all parts of the District, and put me in possession of the information I obtained. With that Officer, I propose a sub-division of the Collectorate into distinct charges for Executive Officers.

15. The want of a survey in Ganjam is seen very conspicuously in the want of correct information on all points connected with the land cultivated, watered, or not watered, and the produce of the land generally.

16. In my observations will be found some remarks upon the Bimlipatam river. The Chittawals bridges and Kunada Light House in the District of Vizagapatam.

17. I regret much that I could not condense the observations I now submit, but with my present duties, I find that it is impossible to do so. I trust however, that this resume with the marginal notes pointing to the paragraphs on the several subjects noticed, will facilitate reference in some degree.

I have &c.,

(Signed) F. C. COTTON, Lieut.-Colonel,
Deputy Chief Engineer.

OBSERVATIONS MADE ON A TOUR IN GANJAM BY LIEUTENANT COLONEL F. C. COTTON, DEPUTY CHIEF ENGINEER IN MARCH AND APRIL 1856.

1. On the 3d of March I anchored in the roadstead of Munsoorcottah, (alias Gopaulpore,) the position of which, the Captain of our ship ascertained, by enquiry from the masters of other vessels anchored off the coast, as he had no sailing instructions to guide him nor any light, or beacon, by which he could determine his latitude, after noon of the previous day, while his dead reckoning was valueless from the uncertain strength of the Northerly current. It must have been an error on the part of the Agents of this ship, that the printed instructions for finding Munsoorcottah were not in the master's possession, and he was greatly to blame himself for not enquiring if such information was to be had, but under the supposition that neither the Agents of ships in general, nor the master of the one I sailed in, were peculiar of their kind, I think it might be well, if copies of these papers were kept in the Custom House, and given to Captains with their port clearances. The want in this case, lost a five hundred ton ship, a whole day, and had there been no ships at anchor in the roadstead, we should have sailed on to Ganjam, from which the vessel would have had to beat back against a violent Southerly wind and strong current to the North, entailing a cost in demurrage of 500 Rupees at least.

2. A most important enquiry has I see been set on foot by the Marine Board, as to the Establishments required for the conservation of the Northern ports. This investigation will I hope, be followed up, and acted upon, as from the absence of all power of control, the roadsteads, are becoming every day even more dangerous than they were by nature.

3. Our first object being to communicate with the shore, we hoisted the usual signal for a boat, but no response was made. The little signal staff showed no flag in answer, nor did any boat come to our relief, till the master of a vessel in the port called upon the Captain of our ship, and lent us the boat in his employ, without which aid, we might have remained on board all day. The point of greatest interest to our Captain and the first subject of enquiry entered upon was where he could throw his ballast of which he had three hundred tons, in his ship. He thought of course, that it would have been necessary for him to have taken his vessel again into deep water, and I cannot say that he did not do so; but it is improbable that he did, after receiving the information given to him by his brother Captain, who said "there is an order against discharging ballast in the roads, but there is nothing that I know of, to prevent it," and such I find is exactly the case. There are two peons in the Port, who receive as pay 2 Rupees a month each, and have the combined duties of Custom House Officers, and Harbour Police, but they can hardly be expected to resist the persuasions of a Captain, who has three hundred tons of ballast to discharge, by means of Coolies taken from the shore; as the loss of their time in pulling to and fro, as well as the charge for boat hire, would be greatly enhanced if the vessel was anchored in deep water.

4. This is a matter worthy of serious attention, the roadsteads of Ganjam while the southerly winds are blowing, are never very safe. The bottom is not good holding-ground, the swell is exceedingly heavy, and if in getting under weigh, a ship's head is cast the wrong way, she is almost sure to go on shore. Under such circumstances, each heap of ballast, is an additional danger, and as every ship frequenting the Northern ports arrives in ballast, it may be imagined how rapidly the anchorages are now deteriorating.

5. On landing I made an effort to get a boat to bring on shore my baggage, but as the swell was increasing, this could not be done, although there was not such a surf as would be considered heavy in Madras. On enquiry, I find that during this season of the year, the surf and wind frequently prevent the shipping of cargo for many days together, and it is considered a favorable day, when the boats can be employed till 10 in the forenoon. The cause of this is clear-

ly the inefficiency of the boats, which carry two tons, and are pulled by only four men, and they for the most part, are wretched specimens of their kind.

6. Though there is nothing to be done for the improvement of the road-steads of Munsoorcottah to give better shelter to the anchorage, much might be done to make the place a better port; Screw Moorings, might be laid down at a very moderate expense, which would give great additional security to the shipping, a pile pier could be carried through the surf, and the boats might be made more efficient, if they were manned as they are at Madras by twelve men instead of four. The Harbour establishment might be increased and that of the Custom House made more effective, and means of communicating with the port by signal, could also be supplied.

Of these improvements, the Moorings and signals might be undertaken by the Government. The pier, and the encouragement of a better class of boats, are works for the merchants to look after themselves.

7. The flag-staff, that would not respond to our signals, had sufficient excuse for its inutility in the want of flags, and this want will, I hope, be remedied by the Marine Board, when a new establishment is formed, as at present, a ship in the greatest danger cannot communicate with the land. Boats from the shore as I have shewn, are not sent off on signal being made, and ships' boats cannot cross the surf. To make the signal staff of use, a signaller with a Telescope, Flags and a copy of the signal code, is required.

8. The accompanying statements * of the trade of the ports for the last 5 years and the duties and dues collected, is from the Collector's Office whether it is trustworthy or not, I cannot say, but when I consider the probability of its accuracy, with the statement of Custom House and Port establishment† before me, I cannot suppose it to be of any value whatever.

I have seen too much of what is considered "fair play" between Ship Captains and Custom House Officers to believe that in such a case as this Government dues are fairly collected, and I feel confident, that a better paid Agency at Munsoorcottah would recover its additional cost.

9. There is one most valuable approach to Munsoorcottah from the interior, which is already of great use to the port.

This road leads from Berhampore, and is a continuation of the Russelcondah and Aska line, which will I hope be all finished and bridged by the end of the year.

On my arrival at Munsoorcottah, I found that the cost of carriage on this line of road had fallen, till there were carts working for the Aska factory at the rate of an Anna a ton a mile. This is however too low a rate while the Aska and Injily bridges are incomplete, and the contract failed in consequence, but when the bridges are built and good arrangements are made for executing the repairs of the road without interfering with the traffic, I feel sure, that the line will be worked profitably at that rate, even with the present rude vehicles in use, and looking to the time when suitable carts with turned axles are employed, the cost of carriage will be very considerably lower still. This change cannot however be expected for a length of time, as the carts now employed, can be built in every village for 8 or 10 Rs. each, while carts of the better sort would cost 35 Rupees, and could not now be built by the artificers of Ganjam, the turned axle and box being quite beyond the skill of the country. The chief exports from Munsoorcottah are rice, oil seeds, and sugar, and the greater portion of the supply, is brought to the port by the road I have been speaking of, which, when completed from Russelcondah to the coast will be 36 miles in length.

10. There is another line by which the produce of the country North of Munsoorcottah is brought to the Port, and although the road is still incomplete, the trade on it is rapidly increasing. By this line of communication, the grain, and oil seed of the country bordering on the Chilka lake, is brought to Munsoorcottah. The produce even of Cuttack finding its way there, by aid of the cheap water carriage on the lake, and on a branch of the Mahamuddy that falls into it. For this important line, something has been done, as carts are able to make use of the great North

* From Rumbah to Munsoor-
cottah 23 miles.
Carts containing 820 lbs.
In dry weather R. 1
In wet do. " 1-4.

road from Rumbah (the Southern Port of the Chilka) to Chutterpore, a distance of 14 miles, which though not bridged or metalled throughout, is in excellent order for some miles, and will this year be metalled, from end to end. From near Chutterpore, the traffic has to find its way for 8 miles across a tract of sandy country, so deep that the load has to be regulated to suit it, and the charge between the port and lake is thus increased, till it is nearly double the rate on the Aska lines.*

The best means of communication between the Chilka and Munsoorcottah would be by canals led from the lake to the Ganjam river, and from that river to the Gopaulpore backwater, for which there are evidently great facilities. On this subject, I shall be better informed, when I see the country North of Ganjam I shall then also I hope, be able to solve a question which is not by any means clear to me at present, i. e. why the comparatively new port of Munsoorcottah is superceding that of Ganjam which although it has a road-stead equally exposed has an entrance always open for boats which is not the case with its rival port.

11. After seeing Mr. Knox at Chutterpore, I determined to proceed to the South of the District, and meet Major Birdwood, who had just reached Chicacole from Vizagapatam, I had no difficulty in obtaining bearers between Chutterpore and Chicacole, although the rate paid, and cheerfully received, is only one 6th of an anna per mile per man.

12. At Chicacole, I had an opportunity of inspecting the fine bridge of 25 arches now building under the management of Lieutenant Palmer. I found the work well advanced, only 3 arches remaining to be turned, and I was particularly struck not only with the goodness of the workmanship, but with the systematic way in which the work was done, under this young Officer, who takes a real interest in his duty, and having excellent ability, is undoubtedly a great acquisition to our department, nor should I omit to mention the name of Mr. Lever, who has been engaged on this work, and is evidently a first rate Overseer quite capable of undertaking a separate charge. I have already addressed you about the Southern approach to this bridge, which will I hope, be completed before the rains, as the traffic over the Nagolea at this time is very great, and the stream at present, a very serious impediment to it. The new bridge not only forms an approach from the South to the large town of Chicacole, but facilitates a very important line of traffic both in salt and grain between Bohully and other ports North of Vizagapatam District, and the towns of Narsipettah and Calingapatam. I came into the Ganjam District inclined to grudge the expenditure of large sums upon the North road, but I am convinced that the money and labour spent on this work has been well laid out, and the returns of the traffic upon the bridge when it is opened, will I am sure, satisfy the Government, that their sanction in this case, was not premature.

13. From Chicacole, I also visited the head of the Doosey Channel, which is one of those about to be provided with Head Sluices. This channel's head is in a very bad position, and a better site cannot be chosen for it, without trespassing on the lands of the Bohully Rajah, who is exceedingly jealous of his rights, as well indeed he may be seeing that he has several channels lower down the river all craving for a supply, while the quantity of summer water in the Nagolea is very small, and quite insufficient for the lands dependant upon the river for a second crop. If it were not for the difficulty of satisfying the various parties concerned, I would advise that an Annicut should be thrown across this river below Palecondah, and that the whole of the irrigation on both sides of the river, should be dependant upon it, but as matters stand, a new general arrangement seems to be perfectly hopeless, and even a partial improvement of our own channels can only be made after the country (from Palecondah to the sea) has been carefully levelled. As soon as Major Birdwood is able to place Executive officers in charge of the Divisions of his District, the valley of Nagolea and that of the Calingapatam river will form one charge, and the officer appointed to it, will take measures to have the whole levelled, in order that the practicability of such a change may be established. It is almost certain, when this is done, that a new course may be given to the Doosey and other channels, which run with too rapid a fall to command all the land that might be watered by them.

14. I took an opportunity while in this neighbourhood of visiting Lieutenant Magnay's Camp on the Chicacole and Palcondah Road, which is making very satisfactory progress under that officer's management, and will be completed in the course of this year. This is a highly important road. By means of it Calingapatam will get a great quantity of produce at a very low charge for carriage, and salt will be taken as a return load through all that part of the country in which forage is dear, and the Brinjaries work to the greatest disadvantage. The Police of the country will also be much aided by this road, and it will facilitate intercourse between the people of the Hill country, and the inhabitants of the large towns, to the advancement of order and civilization, which have made but little progress yet in the frontier of Ganjam. On all accounts, this line is of great value, and much credit is due to Lieutenant Magnay for the way in which he is carrying out his orders.

15. As Major Birdwood had other channels to inspect which would occupy him two days, I determined to visit Bimlipatam, in order that I might get some general knowledge of the port and country about it, and at the same time form my opinion of the causes which led to the accidents at Chittawalsa.

16. Bimlipatam has a river open to the sea throughout the year, which in the dry season is navigable for laden boats at the time of high water. My visit was much too short for me to determine, whether the mouth of this river could be improved at a moderate expense, but I think it improbable that it could. If the sea deepens rapidly beyond the bar, indicating a set of the ocean current upon the coast at this point, a groyne of moderate length run out parallel to the reef of rocks which form a natural groyne on the South side of the entrance, would certainly have good effect, as the deposits made by the loss of velocity in the stream outside of the groynes, would be removed by the stream along the coast. But if the water is shallow for some distance out, proving that the coast is extending, a groyne would probably only alter the position of the bar, but not increase the depth of water over it. The reef of rocks south of the river's mouth is now so low, that the ocean current flows over it, and it is Major Birdwood's opinion, that by raising it with rough stone, the sand which now forms a bank during the season when the ocean current is from the south, would not then enter the river. This is worthy of further consideration I think that the course of the river might be improved by the work suggested, but I have no hope myself of the water over the bar being permanently deepened by it. There would be a tendency to deposit sand north of the reef, when the northerly wind was blowing, but the tide would remove it seaward, and it is possible, that the accumulation on the bar would be even more rapid, when all the sand which is now carried over the reef to the southward, is prevented from passing in that direction, and is thrown toward the Sea. Though I can decide nothing, I think it right to offer these remarks because I have often myself wished for such an opinion (inconclusive though it might be) if given, by one who has been in the habit of considering the very intricate question of sand deposits at the mouths of Indian rivers.

CHITTAWALSA BRIDGES.

17. One of these, is a total ruin, and appears to have fallen in consequence of the water cutting through the road in rear of one of the abutments; but it is so completely destroyed, that I cannot speak with certainty on this point. The masonry of the bridge was not good, but, I do not suppose it to have been so bad as to have caused the fall of the building. The large bridge is still standing, and will not I hope be lost. The cracks as Major Birdwood reported all follow the curves of the arches, and I feel certain were caused by the addition of the Parapet walls before the mortar of the arches was sufficiently set. The flooring of the Bridge and apron appear to be quite unmoved, and I now think with the late Civil Engineer, that the foundations are secure. Under these circumstances, I recommend that the road may be immediately removed and that fluid mortar be poured into the cracks. To ensure their being well filled, a supply of this mortar should be retained and kept fluid for some days over the line of cracks. If this be done immediately, I hope that no further mischief will occur. At all events, I have no hesitation in saying, that till this has been tried, the arches ought not to be removed

The projector of the Chittawalsa Bridges laboured under this difficulty, that he had no good guide as to the quantity of water discharged by the river, as it flows for an unknown distance; through a country above the ghauts which has not been surveyed. The road is one of great importance, and the lost Bridge should be restored with more waterway; and as the quantity of water passing at the time of the extreme floods cannot be calculated from any trustworthy data, it would be advisable to have the road so low, to about 150 yards south of the bridge, that the flood might pass over it in case the waterway were still insufficient.

KUNADA LIGHT HOUSE.

18. On my return from Bimlipatam to Chicacole, I called in the night at the Kunada Light House, which I found exceedingly well kept, under the management of a very intelligent East Indian (Mr. Ramber.)

The height of this light above the sea is 150 feet, but it is said very rarely to be visible 10 miles, whereas, its attitude gives it a range of 15 miles. Under these circumstances, it might be well to allow more burners, and give the ships passing, an opportunity of determining their position, without approaching Santapilly rocks nearer than is necessary. The best mode of improving this light would I think be by increasing its brilliancy by adding more burners. It is true that a clear light may be mistaken for a fire on shore but the object here is to get as great a range for the light as possible for which reason I would not recommend either a division of the burners into two lights, or coloured glasses.

CALINGAPATAM.

19. Calingapatam is the only port of Ganjam which has any shelter. Indeed it is the only port which has not a perfectly open roadstead, and unprotected beach, between Coringa, (150 miles south) and Dhurmah in Orissa, (250 miles north). The accompanying Statement* will shew the supposed export and import duties at the port, as represented by the Custom House returns; but as I have said regarding the same returns from Munsoor-cottah, I cannot bring myself to believe in their accuracy. The whole Establishment for the Collections of the Customs and the Harbour Police consists of one Goomastah with 14 Rupees and 2 peons on two Rupees a month each, while the Office of Customs is in a hut in the native village, quite out of sight of the line of beach. This only is certain, that the statement is not too great, and that we have in Calingapatam a port already sending away produce to the value at least of 4 or 5 Lacs of Rupees, while the land approaches to it, as I shall hereafter shew, are all but impracticable.

20. As this is the season for shipping rice, I had an opportunity of seeing the trade of the port in its greatest activity, and a more curious sight I never remember to have witnessed. In spite of impracticability of the roads leading to Calingapatam, the want of store houses to collect the produce of the country, the most slovenly the management in the despatch of the grain on its arrival, and the absence of all effort to improve the most perfectly primitive and native mode of shipping it. No less than 11 square rigged vessels were taking in Cargoes, of which 4 were ships chartered for different ports in Europe. These vessels were taking the grain as it arrived from the interior from day to day, and as I rode from Chicacole by the principal approach to the port, I had an opportunity of seeing, what the difficulties were, that the grain contractors had to overcome, before they delivered their rice to the exporters on the Coast.

21. Some years ago, a road was made from Chicacole to Calingapatam, it was much too narrow for such a traffic as is in existence now, but it was bridged and for some distance metalled. This road is now in ruins, more than half its length being ploughed up axle deep. The Bridges are in some cases unapproachable, and the Carts have constantly to be driven off the road to make any progress at all. On my ride I must have passed 500 Carts, each drawn by 4 beasts and carrying 820 lbs. staggering, foundering and jerking on, the Carts were dragged at about a mile and

a half an hour. On approaching Calingapatam I fell in with another line of Carts similarly provided and numbering it might be about 300. These were coming from the North, while in and about the place were from 800 to 1000 more, waiting for the grain they brought to be received and measured.

22. Calingapatam is said to have been once a place of note, and it has more than once in later times been a well conditioned town; but the place is now as ragged and unsightly as the country around it, is waste and dreary. There are some old European houses that tell of better times, but look just now like bankruptcy. Here and there a shed, or simply mats upon the sandy beach, with a spare mat or two in case of rain, now constitute the export stores of this Commercial Town, and in keeping with the place, the work is done sauntering and carelessly, as if the object was not to load but only to tantalize the shipping in the roads. The grain is brought in the carts loose and is thrown in heaps for measurement; not by tilting up the cart as would be done in other places, but by chatties carried and thrown down on mats. Round the heap a dozen idlers lounge, and one or two who seem to have the privilege and to enjoy it vastly, stand ankle deep amongst the rice, cleaning their feet in it, as if it gave the brutes delight to send the filth to Europe. The rice is then put into bags so placed that they must be moved two or three times before they are sown up, and when that is done they are taken to some point upon the sand either too low for the advancing tide, or just too high for any boat to reach them; and so they must be moved again. But I need not follow up this description further, there must be energy some where which keeps this traffic moving, but where it exists it is difficult to say; the cost of labor wasted, would of itself make a fair profit on the rice when sold.

23. The country immediately around Calingapatam is barren in the extreme, on the land side all is salt swamp, and elsewhere nothing is to be seen but drifting sand without a blade of vegetation on it. This dreary scene, the morning of my visit could hardly be said to be enlivened by the cattle which lay in thousands about the plain, tied to their yokes, and motionless, or chewing the cud of deferred hope, while their carts remained unloaded. The plain and sand hills were covered by clusters of these carts, which as I have said must have numbered at least 800, so that I must have seen altogether that day about 1600 of these rude conveyances, and as I looked over the country destitute of forage, and admirably suited to canalling, I was naturally led to consider what change might be effected by that means of conveyance being brought into use, and it would be difficult to find a better exemplification of the difference between land and water carriage, than the result of the comparison.

24. The 1600 Carts would bring to the port 550 tons of grain, and there were employed in moving them 6,400 cattle, and at least 1600 men, 550 tons of stone is about the quantity sent away daily from the Dowlaishwaram quarry, and the boats that take it into the Delta by the canals are manned by from 80 to 100 men. A canal approach to Calingapatam therefore, would have removed from the scene that day no less than 6,400 cattle, and 1,500 men; or, as the boats go twice the distance daily that these carts can move, even on good roads, correctly stated, the saving in carriage on the 550 tons would be 12,800 cattle and 3,000 men. I need hardly say that when following out this comparison with Major Birdwood, we came to the conclusion that we ought if possible to open canals to Calingapatam, and I have not a doubt from the nature of the country, and the supply of water obtainable from the Nogalea and Calingapatam rivers, that canals may be cut, and locked, and kept up, for far less money than would be required to give the port good land carriage.

25. Three lines of canal leading to this port suggest themselves all of which appear perfectly; practicable one would run from Chicacole, or some point on the Nagolea river, and pass Chicacole; one from Narsipettah, which is the place of residence of the most active rice merchants trading with Calingapatam river (or from a point, higher up passing Narsipettah) and another from the Nowpada salt pans 20 miles North of Calingapatam. The two former of these lines will require lockage, and water for the purpose may be obtained from the rivers from which they are led. Their streams will afford sufficient water for this during 8 months of the year, and the quantity to be stored for the remaining months will be so exceedingly small, that very insignificant tanks will

be necessary. The canal between Nowpada and Calingapatam will probably need no lockage; but should it do so, the canal led from the Calingapatam river may be made to supply that line also, by leading it from the left bank of the stream. These lines will all be examined by Major

Birdwood and his Assistants, when he returns to the South of the district. It will not however do to wait till canals are projected and cut, something more immediate is required for the relief of the Calingapatam trade, and the first step is to improve very greatly the Chicacole road, Major Birdwood has sent in an estimate for 7,480 Rupees for this purpose, but the sum is insufficient, and it is absolutely necessary that the width of the original road should be increased, and a heavy coating of gravel laid on, to stand the wear of 400 carts a day running upon loose and mis-shapen wheels.

26. I have said that Calingapatam has an advantage not possessed by any other port from Vizagapatam to Dumrah in Orissa. The advantage consists of the shelter afforded by a head land South-westward of the Anchorage, which reduces the swell and diminishes the surf very much during the season of the Southerly winds.

I had not time to examine this head land, to determine at what cost it might be prolonged to give a better shelter, but I do not doubt that if a Canal was opened from the interior, so that stone could be brought at a low price, some extensive improvement might be made. A boat pier of timber would be of the greatest service to the port: and might be constructed at once; but I must say I consider that such works as that should be built by the merchants themselves. Major Birdwood is fully aware of the importance of having one port at least on this part of the coast, in which a ship's boat could communicate with the land; and from which an anchor might be sent off at all times. He will therefore follow up the enquiry as to what may be done for Calingapatam and I shall look for the result of his investigation with the greatest interest.

27. The trade of Calingapatam has derived some advantage from the Salt manufactory at the Oomeravilly pans which is carried by carts into the Bohully Zemindary and up the Palcondah valley. The quantity sent inland from these pans annually is about 4,500 Tons, and its effect on the cost of carriage is very beneficial; but the salt stores should be in Calingapatam, and the merest ditch of a Canal would afford means of carrying it there at the most trifling cost. Before closing my report I shall enter more fully upon the salt trade of Ganjam, considering it as I do the most valuable means we possess, of reducing the cost of carrying our exportable produce to the sea.

28. I must not leave the neighbourhood without noticing that portion of the road which extends from Chicacole to Santashapoor a distance of 39½ miles. This road will I hope be completed and metalled by the end of this year, if the Budget estimate is sanctioned, and as it forms a main approach both to Chicacole, and the important trading village of Narsipettah, as well as a connection between the two, I consider that it was no mistake to complete it as a first class road.

29. From Chicacole I proceeded by the road now opening under Lieutenant Phillips to Kimeddy a distance of 38 miles. This road like all others which lead directly from the interior to a sea-port, will be of incalculable value and the traffic on the line is I am of opinion already sufficient to warrant its being thoroughly metalled as a first class road. Lieutenant Phillips has shown great energy in his work, and very good management of the people to get so much work done in a country thinly inhabited and in some localities very unhealthy. He accompanied Major Birdwood and myself to Kimeddy and we had an opportunity of seeing an important improvement made by him in the suggested line of road. It appears that some mistake was made in the section of the river near Kimeddy, and that the water-way of the projected bridge was insufficient. The error was so great, that it may have occurred from feet having been calculated instead of yards, but whatever the cause may have been, Major Birdwood has been obliged to defer the building of the bridge, and will prepare an entirely new Estimate.

30. While travelling between Chicacole and Kimeddy, I had an opportunity of inspecting the Saravancottah Tank a new work built for the Zemindar at Kimeddy, which, as reported by Major Birdwood, was breached during the last rains. It was found on examination by Major Birdwood, that the bund in the centre of the

valley, was not so high as the floor of Calingulah, and that in consequence the water rose over the embankment and breached it in the broadest part. It is clear that Mr. Assistant Surveyor Walker who estimated for the bund, did so very carelessly; without the use of a level, nothing could be more incorrect than the laying out of the work, and Mr. Walker is to blame for the loss incurred.

31. The Kimedy Estate is now in the possession of a man quite unable from weak intellect to manage his own affairs, and the chief control is in consequence in the hands of the Collector of Ganjam, who has a fine opportunity of improving it. The Estate is one of great value, and capable of being raised in prosperity far above its present condition. Its chief wants are roads and works of irrigation. The fall of rain in Kimedy amounts to about 80 or 90 inches in a year, and from the Forest covered hills scattered over it, hardly a month in the year passes without more or less rain falling. The surface of the country between the hills is not unfavorable for tanking; materials are close at hand, and labour is to be had at 1½ Annas a day.

The irrigation on the Estate is very limited and incomplete, much rice is grown in land chiefly dependant on the rain that falls, but the crop is very light compared with the produce of irrigated land; and as there is no supply of water for the summer months, a sugar crop can only be matured by the aid of wells; good cart roads from Kimedy to the coast will add greatly to the value of its produce, and as they extend into the wild country to the westward, their effect in giving security to property will make them of greater importance still. The advisability of opening communications through this country has been admitted by every body; and there is no reason why a year should be lost in commencing operations on this portion of frontier as there is a considerable surplus income which could not be better invested. The first line that suggests itself is from Kimedy to Buttely from which it should be carried on into the Jeypore country. From Buttely a line more direct to Calingapatam is proposed by Major Birdwood joining the Chicacole and Kimedy road. This line will have a greater traffic than that from Buttely to Kimedy but the latter is the Rajah's residence the Cusbah station and the Cantonment of a detachment of Troops. It is highly desirable that other lines should be sought for, through the hills north west of Kimedy, and a line north would give the sugar growers of the estate, the means of carrying their produce to Aska.

32. On leaving the Town of Kimedy I travelled through a hilly tract of Country in the direction of the coast passing the village of Teckully on the North Road. Malpetta and gained the north road near Teckully, Carts can travel by this line in the dry weather and little is required to make it practicable at all times. Besides leading in the shortest line to the coast it is the direct route to the Nowpada Salt pans. I do not think that it is advisable to make any of these lines first class roads immediately; they should be levelled, and cleared of jungle and drained judiciously, not by continuous ditches on either side, but by drains so placed, as to carry the water as rapidly away from the line of road as possible. It is very essential that the roads should be bridged, but permanent works of masonry are not necessary for that purpose. There are admirable materials close at hand, and ready at any moment, in the roughstone of the hills and the timber of the forest, through which the roads will pass. It would require very little money, labor and time, to open such roads as these which would be passable by a moderate traffic in the rains, and a heavy traffic in the dry weather, and available for the Police and Troops at all times.

33. Taking into consideration the present condition of Kimedy its surplus Revenue, disturbed frontier, and great capability of improvement, I would suggest that a corps of coolies should be raised on the estate for employment in the passes during the most healthy season of the year, and for work in the plains at other times. I am elsewhere recommending the employment of such a body of men in the Government Talooks of Ganjam and their want is as great or greater here.

34. Another point I would strongly urge is that the Engineering of Kimedy to be under the Civil Engineer of Ganjam, of the country while it is under Government management should be left to the Civil Engineer of Ganjam and not to the local Revenue Officer in charge of the estate. Unless this is done the works in the two Districts will not be made to bear upon each other as they ought to do, to have their full effect. In the northern Districts the property of the Zemindars who have rarely the intelligence or the means to improve their

estates is so mixed up with the Government lands, that complete systems of works cannot be arranged, but in this case, having the management in our own hands, we could not do better than lay out all the works under the control of the Government Engineers, who will see that neither the Kimedy works, nor those of the bordering Talooks, are incomplete from want of system.

35. I am sorry to say that I was prevented visiting the Nowpada salt pans. salt pans but I found from enquiry that they had no tolerable approach at any season of the year. During the rains they are surrounded by deep marshes and in the dry weather the country round has not a blade of forage for the droves of Brinjarry bullocks which carry the salt into the interior and are dependant entirely upon the grazing they find on the road sides. Not less than a hundred thousand head of these cattle are employed in carrying the salt of Nowpada during the dry months of the year, when the Marshes are passable and the loss of Bullocks from heat, drought, and want of food at that season is so great as to add very materially to the cost of salt to the consumer; whereas if the salt stores were at any of the shipping ports where it would form a return load for the grain brought down in carts, it would be carried at a very cheap rate to the foot of the hilly country from which point the Brinjarries work most advantageously. To take the salt of Nowpada on account of Government to a better position one or more canals should be opened, but as the trade cannot be entirely changed immediately by these means at least two good common roads should be opened in the direction of Nowpada and a store of salt should be either placed on the north road or at all events so clear of the swamps that the Brinjarries may load their cattle as soon as the monsoon ends, and never have to pass the swamps either while deep in mud or parched from drought. One of these roads should be opened with a view to its junction with the Buttely road and one as a continuation to the Malpetta line. Both should be well drained, cleared of jungle, levelled and bridged with timber, but neither expensive metal nor permanent masonry works should be employed at present.

36. Major Birdwood and Lieutenant Harington are now both of them doubtful as to the propriety of changing the line of the north road from Itchapore to Sunthoshapore, as has been proposed and estimated for; and it appears to me also very probable that it will be found better to keep nearly, if not quite, to the old line. The estimate sent in for this portion of the north road amounts to 46,000 Rupees and makes allowance for an entirely new line for a distance of 40 miles. The new trace is very little shorter than the other and will cross the Mahindra river where it is separated into two branches, but it is through a dense Bamboo jungle which in all probability will be found to be very feverish. It will be more difficult to obtain labour on that line and several large villages as well as 3 good public Bungalows will be thrown out if it is adopted. Major Birdwood will have these two lines carefully compared again before any thing is done and the result of his investigation will be reported. Another point that will be reconsidered by these officers is the advisability or otherwise of spending so large a sum on this portion of the north road. In my examination of this line, I find that there is but little traffic passing continuously on the line generally, and that the amount on the several parts of it is very variable. There is as might be expected, a great traffic on it near all the large trading villages, and in many places now the traffic is greater than it will be, when the direct lines from the interior to the coast are more numerous, as the carts which come upon it by the branch roads have to use it for some distance north or south in their search for roads from it to the ports. It is evident from this that each portion of the road should be considered separately and that instead of the whole line being made equally perfect, the outlay upon each part should be suited to the present or probable demands of trade. If this is done Major Birdwood agrees with me in thinking that the portion I am now speaking of, north of Sunthoshapore, may be for the most part treated as a second class road. Near the town of Itchapore however this will not be the case and I may here observe that while travelling on the northern road I have not yet seen one single part of it which has been made more perfect than the traffic warranted, nor any bridge erected which it was not high time to build. There will however be some considerable modification of the estimates prepared last year, when they are examined with reference to the trade, and on a consideration of the comparative value of the cross

roads which might be opened by the money and labour that would be required to make the north road perfect from end to end.

37. From Cunchelly, I accompanied Major Birdwood, Lieutenant Harington, and Mr. Meyer to the Port of Poondy. The latter Officer is now employed in opening a road from Kimeddy to this port which will be of great value when complete. It is quite in the right line for trade, and when bridged and metalled will reduce the cost of carriage to one anna a ton a mile. There is still however a good deal to be done, and the drainage will be a greater difficulty than was anticipated, metal has to be brought from a greater distance, but Major Birdwood hopes to use as the better material masses of oyster shell which are found in a very solid state in the bed of the back-water. If this is liberally covered with thick coating of gravel it will form an excellent road, but if the upper layer of gravel is thin its value will be lost. Till this line is complete, there will be no tolerable approach to Poondy. It has like the other ports an open roadstead and a river open to the sea, a part of the year. The village stands on a sand ridge and the aspect of the country round is as dreary as the neighbourhood of Calingapatam. There is said to be one Native Goomastah on 10 Rupees a month, and two Peons on 2 Rupees a month each, the former Mr. Knox informs me can give any ship her port clearance under a Telooogoo signature, and such is said to be the case at all the ports in the District. The roadstead could not be improved at a small cost and there is nothing to warrant a heavy expenditure here; something might be done to facilitate the loading of boats in the back-water, but this is not a work for the Government to undertake; each richshed should have its rude wooden jetty, which would be of use whether the river mouth is closed or open, for when the bar is impassable the goods have to be carried across the back-water to be put into other boats on the sea beach.

38. Formerly the mouth of the little river that falls into the sea near Poondy closed each year during the dry season but it has not now been closed for three seasons. This is an interesting fact and a careful enquiry leading to the detection of the cause might afford us the means of judging how the same effect might be produced elsewhere. The only change brought to our notice was in the outlet which is now much more direct from the river and in a more favorable position for supplying the whole back-water on each rise of the tide. It may be that the former opening did not bring the back-water to the level of the sea high-water, and that as that is the case now, the scour is more effectual and capable of securing a constant passage. This is not an improbable solution of the question, but further enquiry should be made on this subject, which is one of high interest to all who are engaged in attempts to deepen the passages through the river bars on both coasts of the Peninsula.

39. Between Cunchelly and Itchapore on the north road, I passed three fine bridges in different stages of construction. They are considered by the inhabitants as the greatest boon that could be conferred upon them as their approach to Itchapore from the south has hitherto been impracticable during heavy rains and accidents have frequently been the result of attempts to pass the streams when partially filled. These bridges have been building under the management of Mr. Assistant Overseer Hopkins and the greatest credit is due to him for the manner in which the work has been done. Mr. Hopkins will now be sent by Major Birdwood to superintend the Injilly bridge which can only be completed before the rains by such thorough good management as may be expected from this Overseer.

40. From Itchapore I went with Lieutenant Harington to visit the small shipping port of Soormoorpoorpettah a wretched looking village on a dreary shore. It has not one substantial building and its only store houses are temporary sheds pitched upon the drifting sand. The port has no tolerable approach to it from the land a heavy surf on the beach and a roadstead exposed to the full force of the southerly wind and yet the exports have amounted in some years to the value of 100,000 Rupees as exhibited in the Custom House returns to how much more no one can say. The establishment is even smaller here than in the other ports I have visited, consisting of one Goomastah whose pay is 10 Rupees a month, and one Peon who receives 2 Rupees a month. I made an effort for curiosity to see these

functionaries but they were not to be found. It was said that the Goomastah lived in a hut in the village and the Peon was sometimes on the beach, but the latter was not there during my visit and when I went to the Goomastah's house he was reported absent too. It would appear to be out of the province of an Engineer to notice such matters but one of my objects of enquiry now is to what extent the export duty would repay the cost of the inland approaches to the ports to determine which it is absolutely necessary that the probable accuracy of the Custom House returns should be kept in view. The port of Soormoorpoorpettah has an open outlet to the sea during some months of the year, but it is now closed and shipments are made from the beach in the ordinary ill mantled masulah boat in use in their Districts. No effort has been made here or any where on this part of the coast to reduce the cost of shipping goods, or expedite the loading of vessels. Every thing on shore is done by coolies, moving ankle deep in the sand and no attempt at a jetty or pier of any kind has been made in the back-water.

BERHAMPORE.

41. The north road from Itchapore to Berhampore should be made with all care as the traffic of the place is very great. Berhampore has not only a very large population employed in the Manufacture of Tassa silk cloths, but it is the Cantonment of a Regiment of Native Infantry and carries on a very extensive trade with the country round. The approaches to such a town should be kept in the highest order.

42. At Berhampore I came upon the Russelcondah, Aska and Munsoorcottah roads the most important line of communication in Ganjam not excepting the approach to Calingapatam of the importance of which I have already said so much. The road from Berhampore to the port of Munsoorcottah is complete with metal and bridges and an allowance of 100 Rupees a mile annually, has been granted for its maintenance. From Berhampore to Aska the work is in progress and the whole line has been coated with metal and gravel. The remaining six small Bridges are now completing, and all that remains to be done are the great bridges of Aska and Injilly the latter of which has been taken vigorously in hand and will I have no doubt be completed before the rains. The Aska bridge cannot be completed this season and from Aska to Russelcondah the road is at a stand, a doubt having arisen as to the line selected being the most suitable.

43. There is one portion of this valuable line of communication which has not been sufficiently provided for the passage through or round the town of Berhampore. The road has been made up to the outskirts of the place from both sides and it was intended to widen the main street a trifle, and carry the traffic through the town, but this was a mistaken arrangement. The traffic is already much too heavy for that and if a suitable road-way was made for it, it would be at great cost to the Government, and inconvenience to the inhabitants. As the town is very crowded, a good open thoroughfare would be advisable as a sanitary measure but there are great objections to leading a heavy distant traffic through any crowded town and as the inhabitants of Berhampore are very generally employed in weaving and dyeing, the filth and dust from the passage of four or five hundred carts daily would be a serious loss to them. Lieutenant Harington has traced a good line round the town and that line should be adopted. By means of it the town will be relieved from the dust and confusion of the carts, while their drivers escape in some degree the danger of diseases which when once they break-out in Berhampore are said to cause great mortality and linger in the town for months. In recommending the removal of the line of the traffic, I hope, I shall not be the cause of the town continuing in its present confined and unhealthy condition. Though the main street is not converted into a thoroughfare it should be opened for ventilation, as should also more than one of the cross streets, the place as I have said is one of great importance and there is no good reason why it should be dreaded for its cholera, if means were taken to cleanse and open it.

44. The road from Berhampore to Aska has a coating of metal and gravel upon it but I fear that it will be found too thin to stand the trial it will be subjected to during the rains. The carts employed upon it have wheels put together very cleverly without tires but they are rather hexagonal than round

and as each angle reaches the ground it scrapes up the surface in the most destructive way. The loss in draft occasioned by the use of this description of wheels is not so perceptible where the roads have not been made but as the roads improve the value of good wheels and axles will be apparent, and we may hope as in Ceylon that their introduction will follow rapidly our advance in road making in the mean time we must be prepared for a great expense in keeping up this, and all other similar roads in Ganjam. We are not able to determine yet what will be required, but where material for the surface is distant, the expenditure will be excessive and it remains to be shown how it can be repaid to the Government.

45. The Aska road is one that leads for the most part, through a country in the possession of Government so that we may expect it to yield some indirect return by the improved condition of the cultivators. It will be the greatest assistance to the Aska Factory on which the prosperity of northern Ganjam in so great a degree depends, and the indirect return from the road from the encouragement that establishment will give to the growth of sugar, will be very considerable although it may be impossible to calculate its effect on the revenue.

One direct profit from it will be received by the duties on exported produce shipped in the port of Munsoorcottah. These have amounted in a favorable year to 3,500 Rupees, a sum which though it would not keep up the Aska road, would go far towards it, and if for every additional bag of rice or oil seed, 2 annas was actually received (which is the present amount of export duty) the wear and tear caused by those articles would be much more than compensated; making then due allowance for the indirect returns, I hope that the increasing export duty from a more active trade will furnish the means of supporting the road without the imposition of a toll which would cause a serious impediment to the cart traffic on the line, as the cart owners, from whom the tax must be called passers nothing but the vehicle and the beasts that drag it, and they cannot give money which they have not got.

46. The Injilly bridge under the management of Mr. Mcquoid has not made the progress it ought, nor has the work been done economically. This young Officer had the same difficulty to contend against, that is felt by our unprofessional Executive Officers in general, a want of knowledge of his business; some succeed better under these circumstances than others, and Mr. Mcquoid has I think been signally unsuccessful. I know myself what it is to work by means of superintendents, who have inaptness for engineering. In spite of every precaution, the cost of works varied in the Godavery Delta, as much as 50 per cent. owing to the skill of, or want of skill in other of the Officers employed. This is an evil resulting from our want of qualified men in the Department, but it is yet to be shewn, than even if the works cost 50 per cent. more than they might have done, under other circumstances, they are not worth all that is spent upon their immediate execution. It will be remembered that the whole of the new works constructed in the 14 years from 1835 to 1849, yielded 69½ per cent. yearly, so that had they cost 50 per cent. more by mismanagement, Government would still have been more than repaid that loss by the return of the first year, while the benefit conferred on the inhabitants of the country, which was of far greater annual value still, would have been clear profit to them. I do not write this in support of Mr. Mcquoid, but in the defence of the system we are pursuing, of doing all we can, with the means at our disposal. I consider that Mr. Mcquoid's work in this, and the Aska bridges (and I may add in the roads under his charge generally) shew him not to be an efficient or even a promising Executive Officer, and I would strongly recommend that he should be employed for some time under an Officer capable of instructing him. Major Birdwood has estimated the sum required for completing the Injilly bridge at 8,000 Rupees and as both he and Lieutenant Harrington consider that the rates allowed in the original estimate were sufficient if carefully used, those rates have been again adopted and I have no doubt, as the work proceeds under Mr. Hopkins, that they will be found to be higher than is necessary.

47. The Aska bridge cannot be proceeded with till after the rains but every preparation will be made, and it will I trust be in use at the end of the year. The same remarks which have been made with regard to the Injilly bridge apply to that at Aska. It ought to have been completed this season and at a cost, not exceeding the estimate above 5,000 Rupees; full allowance being made for the change of site; whereas Major Birdwood now estimates the sum required to complete it at 16,600 Rupees. With regard to the site chosen for the bridge originally, and that on which it now stands, there is no doubt whatever that it has been well placed in its present position, and that had it been thrown across the river in the position first chosen, the most complete engineering blunder would have been made. That site may have had advantages that would have simplified the operation of building it and left its security less dependent on the skill of its builders, but as security was purchasable by an additional outlay far below the difference of the value of the two positions there can be no question that the increased expenditure was advisable.

48. The object of the Aska bridge is to give to the traffic and troops of Goomsoor a passage over the Rushkoolea river; and whether the high road passed above or below Aska, made no material difference to either, except that it might be a trifle more convenient for the traffic to pass, as it now does, along the line of the town. No part of the trading town of Aska loses by the present site of the bridge, and the eastern portion of it, including the Aska Factory gains very greatly by the bridge being in its present position.

49. I am not able to calculate the actual gain to the native town, but as the whole traffic of the place added to the traffic of all Goomsoor, is the merest trifle compared with the traffic of that part of Aska, which contains the factory and is supported by the Sugar works, I may omit all else and content myself by shewing what is gained by the Aska company and those who bring material to the factory. I find by reference to the Aska accounts, that there will this year pass over the Rushkoolea 8,000 tons, and that by crossing below the town instead of at the site first chosen above it, the saving in distance to that tonnage would be 3 miles. When the Bridge is built the cost of carriage, will in all probability, be 1 anna a ton per mile, and at that low rate the saving would amount to $8,000 \times \frac{3}{16} = 1,500$ Rupees. The capital of this sum at 5 per cent. or 30,000 Rupees is then the actual difference on that account of the value of the bridge in its present position, above the value it would have had, if placed in the site originally proposed. But the factory will extend its operations eventually, to full three times its present manufacture; and the real difference will be three fold what I have stated.

50. Even if the whole of this profit came to the Aska company I cannot suppose that the Government would deny to its European and Native shareholders a fair claim to partake of the boon conferred, in proportion to the extent of the trade they are engaged in. If they differ from the traders generally, it is only in their greater enterprise, and power of usefulness, and if help is to be given in due proportion to the risks incurred, the members of this company have not only an equal, but a far greater claim than all the other traders on the line from Russelcondah to the sea. But the profit in such a case is shared by all concerned, and as the chief bulk of the goods consists of raw material which is brought by the Ryots and delivered in the factory, the profit is more direct to the cultivators than to the manufacturing company.

Captain Rundall should have laid these facts before the Government and sought permission for the change of site, but his judgment in adapting the place he has chosen, was most undeniably good and needs no apology.

51. My visit to Aska has enabled me to gain much information regarding the manufacture of sugar, while my tour through the country has admitted of my following up an enquiry I begun in Rajahmundry as to the profits from its cultivation. The result of my observations is a conviction that it is, to the interest of Government to encourage the growth of this article to the utmost, and if that is done I am confident that it will become the great crop of the whole District of Ganjam, yielding, as it will, a profit far exceeding that from any of its other products.

52. The Aska factory has been raised to its present state of perfection by the most indefatigable energy, through many years of difficulty and loss. It is now in very high order and capable of manufacturing more than 12,000 tons annually, a very much greater quantity of sugar than the District yields at present and the difficulty it has now to contend against, is the deficiency of supply. If my information is correct, the whole extent of land cultivated with sugar in the District is between 3 and 4,000 acres, which with a fair allowance for loss, occasioned by insufficient means of irrigation, floods, and other accidents, does not yield more than 4,50,000 pots of Goor; sufficient for the manufacture of about 4,500 tons of the fine yellow sugar exported.

The Aska works have not the command even of this supply; there is not only a considerable home consumption, but there is a great demand for sugar in the south of Orissa and in Nagpoor.

which leads to an active competition in the purchase and although the price has been raised lately, and the quantity brought into the factory at the time I was there varied from 4,000 to 5,000 Rupees worth daily, there is still a fear, lest the quantity should be too small to make the work pay a fair profit for the seasons working. The lowest quantity of sugar that should be turned out from these works should be 3,000 tons a year; which with the present low farming would be produced on 4,000 acres of land, but with the greater capacity of the Aska Machinery and the native demand for consumption, and export by land, we have evidently a market which can only be supplied by the Government giving every encouragement to the growth.

53. It would answer well enough for Europeans to take up the cultivation of sugar, as the profit from a manageable area would be sufficient inducement. In this respect it differs from the cultivation of grains and seeds and from cotton also which are produced in so small quantity from each year that the cost of management would absorb too much of the profit, if an European undertook it. Nor has sugar the great disadvantage of being a precarious crop as Indigo is; only one precaution is necessary; and that in Ganjam is easily provided for, the supply of water throughout the year should be secure. It is difficult to understand why Europeans have not taken up this cultivation, I find that the land will yield an equal weight of sugar with land in the west Indies; there is a market for the produce at hand, and labour to be had at 2 pence a day. Yet the inhabitants of this country are emigrating, and some even going to the West Indies to work on the very same cultivation, with no one single advantage. The whole difference between the two countries that causes this remarkable state of things is that there is capital in the one country, and not in the other.

If English settlers brought their money and intelligence to bear upon this cultivation, Ganjam could, I am convinced, undersell all the great sugar growing countries of the world; but we need not wait for them. There is a population sufficient and as much enterprise as could be expected, and if the Government acting in the capacity of land-lord, did all that is in its power to help the cultivators, it might without taking any part in the actual cultivation or advancing money, give such a stimulus to the growth of sugar, as would make it the great staple of the District.

54. In looking through the expenses of sugar cultivation, I find that there is as much enterprise as could be expected where those who bear the toil and risk, have to pay the profits of their work, to those who supply the capital required. I am told by people of all classes that where the sugar grower works with borrowed money, his cane yields him no better profit than Rice, and those who take up the growth of sugar are very often induced to do so by the trifle of ready money they obtain as an advance from the merchants to secure the crop. The several expenses of a sugar garden are, the cost of the cuttings (or seed cane.) The land Revenue; preparing the land by manuring, &c., watering, and buying or hiring the mill and pans for manufacturing the Goor. The usual size of a garden is about 10 Burnums or 2 acres, the cuttings for which, cost usually 40 Rupees. The Assessment on the land is, I believe, about 30 Rupees; I have an account of the cost of cultivation, but I do not trust it sufficiently to quote it. The cost of watering depends upon the position of the land, but sites are usually chosen where irrigation can be had a part of the year and where a very shallow well will supply water with the least labour when the irrigation fails. The purchase of cuttings is in most cases the greatest item of expense, and as the money has to be laid out a whole year before the crop is cut, the interest is very heavy upon that portion of the outlay. The Revenue is also taken before the crop is sold, and money has to be advanced on that account. The cost of cultivation having in like manner to be advanced, the land is poorly worked and sparingly manured, and as the cost of watering must be kept down as low as possible for the same reason, land is chosen where water is near the surface, whether it is liable to flood, or is difficult to drain, or in other respects unsuitable for a sugar crop. In short the cultivation generally is carried on under the disadvantages of the very cheapest farming, and as those who lend the money work upon the common Indian principle of taking all that they can get when they have a chance, without reference to the future; the growers find themselves with little profit even in the best seasons, and in case of accident hopelessly in debt. Under such circumstances, it is no wonder that the extension of the growth of sugar is slow, although

Europeans might cultivate sugar with profit.

Enterprise kept down by working with borrowed money.

experiment has shown, that under good farming, the profit from an acre is very moderately estimated at 100 Rupees.

55. The Government might do something to remove these difficulties, and the European purchasers might also help. The most important step the Government could take would be, to secure a certain supply of water to land suitable for sugar, so as to remove the cost of working wells and make water so cheap, that as much may be given to the cane as it can take up and convert into sugar. This will, if well managed, work favorably in more ways than one. The best land may then be chosen having soil suitable, and being capable of good drainage. In Rajahmundry where the wells were 15 feet deep, working them was so expensive, that a supply of water for an acre from a channel flowing through the year, was considered by the ryots worth 50 Rupees in the saving of labour only; so much as that, is not spent on water in Ganjam, because such deep wells are not used, and the farming altogether is poorer, but the water would be worth no less; this estimate, it must be remembered, is made by those who had to pay for the water, and who calculated only the cost of the quantity they raised from the wells, whereas the supply taken from the channels was at least double and it contained a manure not found in well water. In consequence of the very favorable climate of Ganjam in which rain falls in almost every month of the year, and for 7 or 8 months there is a stream in the rivers, the cost of a constant supply of water for the year would be smaller than it is in most Districts, and as the monsoon there is hardly less certain than it is on the western coast, there would be nothing precarious in the supply of water.

56. The works I would recommend for this cultivation are, annicuts on the considerable streams, and tanks on the smaller tributaries so arranged, that when the river failed, the tank water might be thrown into the channels. The country seems well adapted for works of this kind and the land suitable for sugar, (if such irrigation is given to it) is unlimited. In speaking of this to a wealthy land holder, he thought the plan all very good, but he believed the whole soil of Ganjam to be so peculiar, that "bunds of tanks could never be made of it," I need not say that this was purely imaginary, and Major Birdwood will gladly undertake to prove to the contrary as soon as he has determined on suitable positions for his works, and obtained sanction for the sums required to build them.

57. Another relief that the Government might give to the sugar growers is to take the Revenue from the land after the crop is sold, holding the land as security; I am quite aware that there is not one Sheristadar in the service who would not object to this; and it would be a most unpopular move with the influential people of the country, because it would help to relieve the ryots from the thralldom in which they are held by the capitalists. So much is this mode of relief objected to, that when a gentleman in Rajahmundry offered to pay the kists for the sugar growers, a party of Sowcars offered him 3,000 Rupees not to begin that system. If the security is good, the Government will not, I am sure, object to this innovation; and I am certain, if it was tried, it would be found that no native land-owner would allow the field to pass out of his possession that had once yielded him the full profits of a sugar crop. Land let on such favorable terms, and supplied with water for sugar the whole year through, might well be paid for at 15 Rupees the acre; it would be worth 50 Rupees, but 15 would pay the Government well. Where very high profits are received from the land, as there would be in this case, there will soon be an intermediate man in possession of it who will be the gainer by the reduced Assessment, not the actual cultivator. Even with the Assessment I name, the land would be saleable at a high price, and the man of capital would be the sugar grower; the cultivator would then be his servant; paid it may be from the crop, but he would not as now have risked the cost of cultivation. The owner who possesses land so valuable will not only secure its being cultivated but will see that the right crop is grown, and to do this, his terms with the cultivator must be liberal. I believe that nothing would so certainly lead to a class of wealthy land-owners as an irrigation suited to

Relief by the land, not the crop being taken as security.



the growth of sugar, and terms favorable to its introduction. And I have not yet seen any province of the Presidency better suited to the plant and its high cultivation than Ganjam.

58. I have noticed the comparatively large sum required for the cuttings of a new sugar garden, and the want of money for purchasing them will be an impediment to the growth, when the Government has done all that I recommend. I am generally averse to Government attempting any cultivation of its own, simply because my experience leads me to expect that no good will result from it. I would otherwise suggest that a few acres of land should every year be planted with cane to be distributed as cuttings; I believe that great encouragement might be given by this means, and at no expense as the actual cost under tolerable management would make them very cheap to the purchaser, but the success of this would depend upon those who undertook the management, and I can't say who has either time or taste for that. I have however suggested this mode of giving an advance, to the owners of the Aska sugar factory and I am perfectly certain that it is worth their while to make the trial.

59. Before leaving the subject of sugar I must be allowed to call attention to the factory at Aska which is now the centre of a traffic on which the prosperity of a great portion of the Ganjam District depends. The variety of trades and manufactures to which it has given rise can only be understood by following the processes in the factory. But its effect may be in some degree estimated by a consideration of the facts, that the consumption of fuel is about 24,000 Rupees worth annually and 6,000 tons of Goor will, it is expected, be this season purchased from the ryots at a very remunerative rate. If this supply is obtained, more than 3,000 tons of sugar will be shipped, and the profits from the works will be satisfactory. But whether working to the profit anticipated or to loss such as it has hitherto had, it has equally to claim to every help from the Government. The enterprising owners have run a great risk, and several have met with a loss not liking to go on, in the venture. A capital has been sunk which would have made no insignificant appearance in our list of Public Works; very few of which indeed approach the Aska factory in cost, and it is more directly beneficial than almost any thing that has been done by the Engineer Department, excepting only our largest irrigation works; from the sum it annually circulates in the District and which will this season nearly equal in amount half the Revenue of the Collectorate. I am induced to offer these remarks because I have met with a feeling here and there that such great works might very well be left to themselves. There is a very common notion that great manufacturers make great profits, and can fight their own battle and moreover that they have rather a too determined way of asking for what they want. This may be true in some cases, and I hope it may be so with the Aska manufacturers. Their success will be a most valuable example; they deserve all they earn, and if their demands are always as reasonable as they now are, they cannot be too resolute in making them. What they most want are, encouragement to the growth of sugar, and such fine roads elsewhere as that which has been opened to their benefit, between Aska and the port of Moonsoorcottah.

60. From Aska we proceeded to Russelcondah, and although travelling some portion of the road in my palankeen before day light, I had in going, and returning, opportunity sufficient to determine the question as to which is the best line of country for the great road, and I must say I give the preference to that suggested by Lieutenant Harrington. The present line might have been made to follow the highest ground between the two rivers; very much more strictly than it has; and had it done so, it would have answered tolerably, when the river embankments were raised; but there is no sufficiently good reason for that line being chosen, and the country south of the Lohurkundy has great advantages which should not have been overlooked. Even though a road may be secured through low ground cultivated with rice, such as the land between the two rivers, there are in this country great objections to such a line where as is the case here, the cattle employed upon it are dependent on free grazing for their subsistence. The repair of the road as well as its first cost will be greatly reduced

by taking it on the higher ground, and the position of the bridge over the Lohurkundy, which if placed suitably for the proposed line will be close to the town of Russelcondah, and will be very advantageous as a bridge is urgently required there. As I had not received the orders of Government regarding Captain Rundall's letter when I was in Goomsoor, I am not able to answer the question as to whether there is, or is not a ridge of high ground between the two rivers. There certainly is no such ridge for a considerable distance, and anomalous as it may seem, it is very probable that there may be a hollow instead of a ridge in that position from the point of junction of the two rivers to Russelcondah, though the distance is 6 miles. Such will invariably be found where the point of junction has become by degrees, lower and lower down the stream, by the extension of the point between them from deposits, and such actually is the case, for some miles above the junction of the Lohurkundy and the Mahanuddy. In such cases the Delta form of the country is found to exist. The highest ground is close upon the bank of each river, and there is in consequence a hollow between them. Near Russelcondah this appears to me to be the shape of the surface, and Mr. Mequoid's road is in the valley. It was on this account that Lieutenant Harrington was led to think so many bridges necessary as the water stood along the line of road. The remedy required here was not additional bridges, but embankments, and if the case had been understood, the road would have either formed one of the embankments, or have run parallel to one of them. The work done will not however be altogether lost, as the road in the dry season will be a great convenience to the inhabitants of the space between the rivers and when the embankments are made, it will form an excellent approach for them to Russelcondah, even without being metalled. The accounts of money spent on each part of the work done, as well as that required for the completion of this important road will be submitted by Major Birdwood, and Lieutenant Harrington, who is with that Officer now in Goomsoor, will trace the new line.

61. The embankments of the Aska river were being laid out while I was there and one complete portion will be secured before the rains. They will be of great value, and I see no cause to apprehend their doing injury to any one. There will be a slight additional rise near the sea, but as the general fall is 4 feet a mile, and there is no length of Delta channel, the difference in level will be very inconsiderable any where. The cost of guarding the cross drainage where it falls into the river, will be greater than was anticipated; but as the rise in the surface is very trifling compared with that of the large streams that have been similarly treated, the sluices will be far more simple, and easily built.

62. In Captain Rundall's Report upon the Irrigation of Ganjam (of 30th October 1854) some valuable suggestions are offered as to the works that should be immediately undertaken; but there will be a difficulty in carrying out these proposals, or indeed in making any great improvement in the irrigation of the District, if some steps are not taken to obtain information as to the area and condition of the wet land at the present time; and the value of a supply of water, for one or more crops. There is but little known on these subjects in many Districts, but in Ganjam there is the most profound ignorance on every point connected with the extent cultivated, and the value of its produce; nor under the present system, does there appear to be the least chance of any better information being obtained. Mr. Elliot in a letter to the then Collector, wrote in March 1850, suggesting that it would be advisable rather to fall back upon an ancient division and registry of the land which had been lost sight of, than to allow things to remain as they were, but this was not carried out, and when Captain Rundall proposed to open a channel from an ancient one on the Aska river, to water the country between Aska and Munsoorcottah he was led to suppose by the Thasildar that an additional revenue of 50,000 Rupees might fairly be anticipated from the outlay of a lac. But when a project was prepared, and sent for an opinion, to the Collector, it was stated by the Thasildar of that time, that nothing could be expected beyond the saving of some small remissions of revenue. Now, although the area of cultivable land had in the first instance been over-rated, there was no doubt whatever that an immense increase of produce would result from the works proposed and why there should be no revenue in proportion does not appear; but the truth is, that the word "wet land" has so indefinite a meaning, that it may be given to lands irrigated, or not irrigated, or partially supplied with water, or flooded, and besides that there is no knowledge whatever what the produce is from lands under any one of these conditions. Land

capable of producing by the help of some rain, a tolerable crop of rice is "wet land"; and so is that which has water for two crops or is so well provided, that it might have a crop of sugar grown upon it; and if there is a Cutcherry "mamool" of what an acre produces, such has been established without any reference to the use made of the land. Whether it is well farmed, or cultivated with the poorest means, the mamool is the same; and if it has any foundation at all, it has no reference whatever to the capability or real value of the land. While this state of things exists, the Engineer Department may spend all the money possessed by the Government with no certainty of any direct returns from their works. The Engineer may survey the land, shew the measured area of what he waters, and point out what is drained, and what secured from flood; but when this is done, a statement may be found to prove that it was all "wet lands" before, and no extra revenue can be expected from it. The fact of the land not being watered before, will not alter the case, for what is called in the accounts wet or dry, no one can point out on the ground.

It is said in the general way, that there is no use in irrigating for a second crop, because the ryots grow a second crop, and never had been taxed for it. Whether that crop is rice, or oil seed, scanty or abundant, secure, or precarious, still the people like to have it without tax. They would not, (it is supposed) like to have a crop worth 15 Rupees an acre, if they have to pay an assessment of 2 Rupees, so well as a crop of the value of 5 Rupees, for which they pay nothing. Such is the supposition and a most mistaken one it is.

63. I have seen a good deal of the Hindoo cultivators of the country, and the high price that they are ready to pay when dry land is irrigated has frequently astonished me. But the fact is that they are not so ignorant as we are. They live in their fields and see all that is going on from day to day, and know right well the exact effect of water on their crops. They don't confuse between a crop that has yielded a poor harvest, and a heavy crop, they see the risk that each field runs, and know the cause of the mischief that they dread, and although there may be a fear when any new work is proposed, that it will not succeed, and that they will be taxed, nevertheless, yet when the work does succeed, they see the change, and know the value of it; and if they do not say all they know, they are willing enough to own the Government claim to additional revenue, and to give it, if too much is not demanded.

It is for us to determine what the value of the improvements are, and to take only such portion of the increase of produce as shall pay us a liberal profit, and leave the Ryots, as they will be in all cases, very much greater gainers than the Government. But to do this, some trouble must be taken to learn what the land will yield according to the treatment it receives.

Mr. Elliot began an enquiry in Rajahmundry with a view to this, which if followed up would have been invaluable, but the information he obtained was thought insufficient, and therefore it was not added to till it was made sufficient, but it was laid aside as useless.

64. The Ganjam District has from the very favorable distribution of the rain and the form of its surface, and the goodness of its soil, capabilities beyond most parts of the presidency, and there are admirable opportunities for constructing the most effective and profitable works of irrigation, and as soon as the probable result of them has been determined on the best data procurable by the Revenue Officers, they may be undertaken.

Captain Rundall has suggested some of very good promise, and Major Birdwood is searching for sites in which he can place works especially suited to the cultivation of sugar; but the Revenue Officer must work with the Engineer, each in his own province, or the Government will not get the return it should from the money spent; the upshot of which must be, that the irrigation of the country will be suspended. So completely has the value of irrigation been ignored in Rajahmundry, that in one report it has been shewn, that a talook without irrigation has yielded a greater increase of revenue than those thoroughly watered. And though it is not probable that such an assertion will be made in Ganjam, I maintain that no money can be securely spent, till such results of revenue management or revenue statement are rendered impossible by the produce from irrigation being determined by actual trial. It is absurd to suppose that there can be any real difficulty in obtaining such information. If it could have been had at no

less cost, it would have been worth while to have spent 20 lacs of Rupees in procuring it in 1853; for since that time, far more than that sum has been lost to the Government by the doubt which has led to the watered lands of Rajahmundry remaining untaxed.

65. From Russelcondah I returned through Aska to Chutterpore, and on reaching that place my knee was so much swelled from an accident, I had met with near Chicacole, that I was unable to leave the house for a fortnight and missed in consequence seeing the port of Ganjam, which as I have said elsewhere, I was particularly anxious to compare with Munsoorcottah.

66. At Chutterpore there is a very curious lake of fresh water which must have risen to its present height by artificial embanking, though there is no decided bund to be found. This collection of water, which extends along the line of coast for about three miles, occupies the hollow almost invariably met with within the sandridges of the coast, but instead of being on the sea level, and open to the tide during the rains as is usually the case; its surface is 10 feet above high water mark and there is no channel by which it is ever drained. The surface water in the monsoon flows off into the Munsoorcottah backwater, and as no rock is said to cross the line, I feel confident that the constant construction of small earthen banks, as in the course of time not only prevented the existence of a drain to the level of the bottom of the backwater, but has by degrees raised the surface of the water to the height at which it now stands. Major Birdwood and Lieutenant Harrington spent what time they could spare in the examination of this lake, but I was unable to join them, and there is still much to be learnt about it, as on it depends the plan adopted for connecting the Chilka lake and Ganjam river with the port of Munsoorcottah.

67. If a canal is opened from Ganjam southwards, it must pass through this hollow, and it becomes a question whether it would be advisable to drain the lake and allow the tide to flow through it, or whether it would be better to lock up to the surface of the lake, and down again to the tide level. There is now some cultivation dependent upon this collection of fresh water and a revenue of 1,000 Rupees is said to be received from it but more information is required on this subject.

68. The points to be decided before a canal is projected through the small lake at Chutterpore are, whether it is advisable to keep up the water to the present height or to increase the quantity for lockage or for extended irrigation; whether the land irrigated might be better watered from another source, and the lake drained; or whether the great body of fresh water now applied to no purpose might not be usefully employed, either for irrigation or to produce water power that might be applied to machinery, I am inclined to think that it will be better to lock from tide level to the present height at least, if it is not necessary to rise a yard higher, but the enquiry into these particulars will occupy sometime, and I must leave them to Major Birdwood who agrees with me in the advisability of connecting the Ganjam river with Munsoorcottah river, if only to reduce as far as possible the injury done to the north road by the heavy and increasing traffic between the Chilka and Munsoorcottah.

69. The Ganjam river has been navigated experimentally from Aska to Ganjam, by Mr. Minchin of the Aska Sugar Factory, who took a large raft of Rum casks down the stream during the rains; the voyage was very successful, and had there been a canal from Ganjam to Munsoorcottah, the venture would have answered perfectly; but on reaching Ganjam, land carriage was not available, and the casks remained so long in the river, that there was some considerable loss in their contents. If suitable boats were brought into use, this river might be navigated for several months of each year, and as soon as the more pressing necessities of the Aska works are supplied, I have no doubt that the able and energetic gentlemen who have now charge of that establishment, will turn their attention to this means of reducing the heavy charges now incurred by the Company, in the carriage of Rum and Sugar to Munsoorcottah.

70. The North road from Berhampore to Rumbah (28 miles) has now a heavy traffic on it. There is a great consumption in the towns of Berhampore, Ganjam and Chutterpore, besides which there is an active trade between Munsoor-

cottah, Ganjam and the Southern ports of the Chilka lake. The thorough repair of the north road was therefore very necessary here, and it is in very good order from Berhampore as far as the Ganjam river, but between Chutterpore and Ganjam there are still a good many small bridges required, where nullahs are now passed, by those wretched substitutes for them, road dams. From Ganjam to Rumbah the road is now being made, and in the present state of the trade it is very much required. From Rumbah to the frontiers of the Madras Presidency, is a distance of 13 miles, and the road is said to be in very bad order, but it is of less importance there, as the Chilka lake affords a much cheaper carriage than the road would, if made ever so perfect.

71. After completing my inspection of the north road, through the Ganjam District, I can safely say that no part of it has as yet been made which was not urgently required, either as an approach to towns of importance, or as parts of lines leading to the sea ports. Major Birdwood will report again upon that portion of the line where a question has risen as to the course that should be chosen, and will reduce the breadth of metal on all those parts on which the traffic is light.

72. Rumbah is a small village near the south end of the Chilka lake, and is the principal place of landing for the goods which seek a market in the Ganjam District. There is another small village the name of which I have lost, that has a landing place also, and the traffic passing through the two villages, is altogether very great, and if I am rightly informed rapidly increasing, in consequence, chiefly, of the demand for oil seed in the port of Munsoorcottah. As the villages are in the country of a Zamindar, I was unable to get an account of the quantity of rice and oil seed landed there; though an account must be kept, as the Zemindar levies a toll upon them. Neither could I ascertain with accuracy the rate of duty paid, but it is evidently very light, as the boat people make no complaint either of the amount taken, or the means used, in collecting it. A Memorandum was given to me as the rate, but it was not considered trust-worthy.

73. The trade of the Chilka is carried on in boats quite peculiar to the lake, and in some respects well suited to it. They are made of planks without ribs or keels, and are perfectly flatbottomed with perpendicular sides. This form is necessary in the unimproved state of the landing places, as the lake is very shallow at the edges, except where a rocky knoll forms the bank; and in such positions goods cannot be landed with safety from the breaking of the waves. The bed of the lake is all of the softest mud, for the slope from the shore is so slight, that but for the rise and fall of the tide, loaded boats could not approach the most favorable landing places within several hundred yards, and when the rise of tide is slight, as it is at the south end of the Chilka at this season, the boats can only be unloaded by the carts being driven into the lake to meet them. These boats are pointed against the wind, and have mat sails when the wind is fair, set upon two loose bamboos which come down upon the heads of the crew, if the sail is by accident shaken in the wind, I never saw any boats so rude in their rig and consequently difficult to manage, but even with these drawbacks and most lazy working, the carriage on the lake is very moderate, as the accompanying Memorandum will shew. There appear to be a great number of these rude boats which have been kept up principally by the demand for firewood from the western side of the lake, for the manufacture of salt on the north shore; and on the strip of land between the lake and the sea; but of late years the demand for oil seeds in Europe has led to its increased cultivation in Orissa, as well as elsewhere, and as there are no exporters there, for a reason sufficiently cogent, which I shall remark upon hereafter, the crop now finds its way to the ports of Ganjam for shipment. There has always been also an active trade in rice on the lake and the quantity landing at the village of Rumbah during my stay, could not be less than 50 tons a day.

74. The produce of Orissa is evidently driven to the ports south of the Chilka, from the total absence of all means of carrying it from the interior direct to the sea. Had this been the case there must have been great export trade from the Delta of the Mahanuddee which is one of the most fertile countries in the world; with no greater impediments to the loading of the ships than are overcome at all the small ports on the coast of Ganjam. Indeed there is one natural port in that part of the coast, which might be made a place of great trade, and give life and wealth to all the finest parts of Orissa. The place I allude to is Dumrah, which only wants approaches from the land to become of great importance as the shipping port of that highly productive and already densely peopled Delta.

75. But the only road from the interior to the coast is from Cuttack, to Pooree or Juggernaut, which perhaps because they are Collector's Stations have this means of communication afforded them. But this road having no metal upon it, and being of pure delta mud, is so deep after the slightest rain, that carts can hardly travel on it, and I may here observe, that from our frontier to Calcutta, the great road, though made with great cost on a high embankment is nowhere metalled, and in consequence is hardly passable for carts excepting in the driest weather.

76. During the rains a branch of the Mahanuddee which falls into the Chilka, is navigable as far as Cuttack by the lake boats, and much use is made of it, but if the Chilka was joined by a canal with Munsoorcottah, or even Ganjam, the traffic on that line would be greatly increased, for when once afloat, the cost of carriage for each mile is so small that distance is of little consideration.

77. Before I make my proposal for turning the navigation of the Chilka to better account I must make some remark upon the capabilities of the lake with reference to the several purposes to which it might be applied; but I regret to say that I am unable to go into the subject so fully as I had hoped to do, in consequence of my lameness having prevented my getting to all parts of it, for a complete examination. I might be induced in consequence to withhold my remarks which must necessarily be crude and unsatisfactory, but as I have said with regard to the Himilipatam river, I am always glad myself when making enquiries upon such subjects, to have the advantage of all the opinions and suggestions that have ever been given upon it, and I record mine in this case, to be of whatever use they may to those who take up the subject hereafter.

78. The Chilka might be turned into a fresh water lake without the slightest difficulty, and in that case, a vast area of the finest land might be brought under cultivation and irrigated. We have in the Colair lake a case precisely similar. The bed of that lake is below the level of the sea high water, indeed in parts it is below low water mark, and such is the case with the Chilka. The Colair is connected with the sea by a channel open to the tide and but for artificial means its waters would be like those of the Chilka, or any ordinary backwater, salt in the dry season, and fresh or nearly so, during the rains. From time immemorial (I believe) the Colair has been secured against the tide by embankments which have every year been cut to allow the passage of the floods from the river that fall into it. The openings for this purpose were closed after the floods had passed, and before the water in the outlets had become salt. This was an expensive operation, and a constant source of anxiety, but the return from the lake land was enormous; and the skill of those employed upon it had become such that currents which would have appeared perfectly uncontrollable to those who were unacquainted with works of the kind, were brought under restraint at the time required. This rude mode of management has been now permanently superseded by the construction of a weir which allows the escape of the water while it prevents the ingress of the tide the crest of the work being above high water mark.

79. Such a work is quite practicable between the sea and the Chilka. The rocky islands would afford admirable material for the purpose, which with the water carriage of the lake could be employed in any quantity at an exceedingly cheap rate. The original mode of cultivating the Colair was to plant those parts of the bed which were left bare by evaporation or with shallow water over them, and the cultivation extended lower and lower as the water receded during the hot weather; the richest land was at the lowest level that was cultivated, but when the lake dried below a certain point the water became brackish and unfit for irrigation. There was great gambling in this cultivation and every year some portion was lost; but the profit from what was saved was so great that every available acre was taken up, not by the inhabitants of the neighbourhood, but by people from a distance who every year came to bid against each other and scrambled for a share of the lake. The Godavery Annicut has put an end to this and with the permanent outlet, the cultivation is secured. The whole bed of the lake above the level of the brackish water can be always cultivated, and the crops watered without the slightest risk by water from the Godavery; and this change might

as readily be brought about in the Chilka, the bed of which would no doubt be found equally fertile, while the area of available land would be infinitely greater. That the bed though salt now, would be soon fit for cultivation, there can be no reasonable doubt, as we are constantly recovering land from the Malabar backwaters, the beds of which are as salt as that of the Chilka, but it is found that in the second year the soil has been so well washed, that it suits rice perfectly, and yields abundant crops. The water for its irrigation could be stored on the small streams that fall into the lake, or it might become a portion of that great irrigation which ought to exist under an annicut thrown across the Mahanuddee above Cuttack.

80. The Chilka might thus be made to produce either rice or sugar and as Orissa has so dense a population there can be little doubt that a crop would be raised on the whole of it, but whose property the land of the lake would be considered I do not know. I have pointed out the way in which it may be made use of; by excluding the sea and I will now venture an opinion as to what might be done with it if it was considered more advisable to make it a place of shelter for sea-going vessels.

81. The management of the outlets from the rivers and backwater on our coasts is still puzzling all who are attempting it, and whatever may be the correct theory of the deposits, which invariably form bars across them immediately beyond the line of Coast, it appears probable that it will only be found practicable to keep a deep passage to the sea by artificial means, at moderate cost, where there is a set of the ocean currents upon the shore, and a consequent tendency to encroach upon the land from a steep beach: where this is found, it is highly probable that by fixing the breadth of the outlet, a certain depth may be obtained and secured; greater or less in proportion to the quantity of water flowing through the passage. In some of our rivers which have a constant drainage from the country, a navigable passage through the bar is kept open of depth sufficient for large cargo boats, even when the area of backwater is very small; but some of the best outlets for navigation are those which are mainly dependent for their depth on a great area of backwater where the tidal action throughout the year is powerful and constant.

82. The Chilka lake is supplied by a number of small streams, and only one of great capacity which carries a large volume of water from the Mahanuddee in the monsoon and I believe conveys little or no water into the lake in the dry weather. The very great area of the lake is against a deep passage being cut by the monsoon drainage, as its wide surface rises very gradually and a broad outlet will open, whereas had the lake been small a greater head of water would have been raised by the 1st sudden flood, and the outlet would have been deepened. I have elsewhere observed this difference between large and small backwaters in some situations the effect is observable throughout the year, in others the depth is so much more dependent on the tide than on the drainage, that the temporary depth obtained during the first flood of the monsoon is comparatively of little importance, as however our knowledge of the whole subject is very incomplete, it is evidently advisable in attempts to improve these outlets, to turn every current to account as far as possible. In the case of this lake, which is very much larger than any of the backwaters on either coasts of the peninsula, we have at our command a much greater tidal scour than is to be had elsewhere not only from the greater area but from the rise and fall being greater also, we ought therefore *ceteris paribus* to have a greater depth of water through the bar. What the depth is I am not informed, as I was not able to examine it; but there are reasons why the quantity of water entering and leaving the Chilka with each change of tide is not what it might be; and whatever it is, I feel sure that it might be considerably increased.

83. That the quantity of water entering the lake is from some cause greatly deficient, is proved by the rise and fall at the south end of it, being far less than the rise and fall in the sea, whereas had the supply been complete, there would have been no less a change of level within and without the bar; it seems probable therefore, that if we can detect the cause of this and correct it even partially we might add so great a volume of water to the tidal current, as materially to affect the section of the outlet and if in doing this we re-

gulated the breadth judiciously we should secure the most favorable form of section, i. e. that which would convey the whole amount of water required with the greatest depth. The cause of the deficient supply of water is, I think attributable to the position of the present outlet which

A plan of the Lake.

* Appendix D.

is the most unfavorable that could be found if the object be to deepen the passage. It is at one end of the lake, and the passage within is neither direct nor free from obstruction, and if a map * of that portion of the lake is examined it will be easily imagined that long before a full supply of water could be made to reach the south extremity of the lake the tide will have turned. If no other cause

The water of the lake held above its proper level by the prevailing winds.

existed this alone would reduce the ingress of water very greatly, but there is another cause which aids this in a very remarkable degree.

During the dry season the wind blows in a strong continuous gale from the south for months together, and it is clear that the level of the lake water is so greatly disturbed by it, that the surface is much higher at the north end of it than the south. I am sorry to say I was unable myself to determine what the difference in level was, but the effect of continuous gales in such cases is noticed by Mr. Ellet in his work upon the Mississippi and the result of such an action of the wind is registered in figures on the houses of Saint Petersburg, where a steady gale blowing up the gulf of Finland, checks the current of the Neva and swamps the delta city. This accumulation of the water near the entrance of the Chilka, must reduce greatly the quantity entering the lake; and this doubtless accounts for the very trifling tide at Rhumbah, which, when I was there in April, did not amount to more than $1\frac{1}{2}$ foot at the height of the springs, while the tide in the sea is said to rise and fall 5 feet. At the time I speak of the level of the southern end of the lake was at least 8 feet lower than its surface level is. During the North East monsoon, when the water is somewhat increased by the streams falling into the lake, but still more by the wind, which then is as steady and almost as violent from the north, as it is from the south in April.

84. A great ingress and egress of salt water would be effected by two openings one in the north and one in the south, as the action of the prevailing winds would then cause currents through the Lake, but the best effect from the tidal current would probably be obtained by opening an outlet midway between the ends of the lake, and if this could be done, through

Vide Appendix D.

a part of the spit of land which separates the sea and lake, where it is not so wide as to make the passage too long, I feel confident that the tide could be raised easily to its full height in all parts of the lake, and the scour increased to its maximum; and if at such a point it was found that the sea shore was tolerably steep, i. e. having no tendency to "form out" I feel assured that an outlet might be made and kept deep enough for ships to enter. I won't presume to say what depth might be obtained, but we have at Cochin both tide and extent of backwater far less favorable, and there the depth at spring tides is 14 feet, and the vessels of 1000 tons built inside the river are taken to the sea over the bar.

85. Whether it would be advisable at the present time to lay out the sum required for either cultivating the bed of the Chilka, or improving its entrance from the sea in order that it might be made of some use to our shipping is another question. I am not inclined to urge one improvement or the other, at the present time, as there is so much to be done of more immediate necessity in Ganjam, that I would not employ the labour of that District in the work and while Orissa is at the mercy of the Mahanuddee without the means of carrying its produce to the sea; flooded at one season, parched with drought at another, and almost as far beyond the reach of a market as if it lay in the interior of the Continent, the Chilka lake is not a fit subject for the attention of the authorities of that country; at present the inhabitants of those wonderfully capable Districts, Pooree, and Cuttack, European as well as Native, seem to speak and act as if they only lived there at the sufferance of the Mahanuddee whose rule is as arbitrary as their submission is pitiable.

86. Crops are gathered with thankfulness when the floods spare them, streams are navigated till some drift or sand bank forbids their further use; villages rise and fall with each change in the set of the current and it is said that the town of Cuttack itself is under orders to quit its present site, if the waters of the tyrant river should ever again reach the point they did last year.

It is not probable that this state of things will last for many years, although the alarm caused by the Damooda river has for the present thrown a doubt upon the utility of embankments in the minds of those who have not had the advantage of seeing what has been done by their means in the Southern deltas. That the Damooda is too big for its bed there is no doubt, and that such vast volumes of water and mud, as are poured down the valley of the Ganges, will cause anxiety to those on whom the duty devolves of controlling them, is little to be wondered at too. That there should be failures and losses here and there under any management is not surprising either, but that such occasional losses should be made the reason, for the rivers of India generally, being left uncontrolled, as beyond the power of human skill to manage, is most incomprehensible, and this too, when we have Tanjore as an example of what good may result from the strict confinement of a delta river, and an artificial disposal of its waters, with the experience of its working for a hundred years. It would be absurd to limit the advantages which that country receives from its modern hydraulic works to the Revenue it pays to Government; but taking that as a means of comparing the unimproved District of Cuttack, with the well regulated delta of the Cauvery, we find the Revenue of the former to be 8 Laes of Rupees, while the latter pays more steadily, 45 Laes, from an area very considerably less. Taking it for granted that the time is not far distant when the Mahanuddee will have its amicut, and the delta be secured against flood and drought its lands irrigated, its produce carried almost without cost, and a water power nearly equal to the strength of its working population, added to its effective labour, as has been done for the deltas of the Godavery and the Kistnah in the last ten years, the employment of the Chilka in one of the ways suggested, may not be far in the future. A possibility that must be my apology for wandering beyond my own limits, and leaving the immediate object of my tour, the Budget for the coming years.

87. There is a small work, which I am very anxious to see commenced at the Ganjam end of the Chilka lake, a Canal connecting it with the Ganjam river. While at Rhumbah, I made an excursion to Pyragee, a village situated on the land which separates the lake from the sea. Major Birdwood and Mr. Harington were with me, and we were all struck with the facility that existed for opening this communication. A good lithographed Map of the Orissa Provinces, on a scale of 4 miles to the inch, sent to me by Captain Thullier, the Deputy Surveyor General of Bengal, gave a fair promise of an unobstructed line being found. Our observations during our visit to Pyragee confirmed our belief; and since leaving Ganjam, I have received a most satisfactory notice of the line from Major Birdwood, who has had the country levelled and sends so favorable an account on all points, that I hope a mere trifle will be wanted to open the communication. On this being done, the Port of Ganjam will have the full advantage of water carriage from all the borders of the lake; and during the monsoon much of the produce of Cuttack and Pooree will be carried through at a very cheap rate. Munsoorcottah will still have to pay for 12 miles of land carriage, but by the time we are allowed to proceed with new works for the improvement of the country, I hope a project will be prepared for completing the line from Ganjam through the Chutterpore Backwater. If the cost of the Ganjam and Chilka cut is as small as I expect it to be, it would be better to leave it quite unobstructed by tolls, but the canal to Munsoorcottah will be more expensive, and there is no reason why a light toll should not be raised upon it.

88. As the success of the efforts we are now making to reduce the cost of carriage from the interior to the Sea, depends in no slight degree upon the salt trade, I shall offer some remarks upon it, and in so doing it is possible that I may notice several errors in the mode of management which have already attracted the attention of Government and are either under investigation or in the course of correction in other parts of the Presidency.

89. That the profits derived by the Government from the Ganjam salt is not what it might be proved by its very limited sale in comparison with the extensive area of country demanding it. Ganjam supplies not only a breadth of country for greater than that provided with salt from the western coast, but has also an extensive country to supply inland from Orissa, which I suppose to be the conse-

quence of salt being made in the coast districts north of Ganjam at much greater expense, by the use of fuel, instead of by solar heat only. I cannot say what the actual area of country dependent upon Ganjam may be, but I may safely say that it is not less than 3 times that dependent for salt on Canara while the sale in Ganjam is rather less than in that district, and it is evident that even there the demand would be greatly increased if the price to the inland consumers could be reduced. The financial results therefore may fairly be anticipated from the removal of every impediment to the sales of salt in Ganjam, renders the subject of the highest interest, and seems to call for an investigation more searching than can be given it by the local Officers, who are already overwhelmed with business.

90. I need not dwell upon the direct profits derivable from an extension of the sale of salt, they have been sufficiently discussed already. The importance of the trade to an Engineer is in its beneficial effects on the cost of carriage, which although it has been long admitted and of late years has led to arrangement being made in some parts of the Presidency with that in view. The effect that may be produced by it has not even yet I think, been fully appreciated any where, and seems hardly to have been thought of at all in Ganjam.

91. There can be no doubt that the cause of the very small consumption of salt in the country containing its supply from Ganjam is mainly attributable to the great cost of carriage, and only in a very slight degree to the amount of duty levied upon it by the Government. It will be seen by the map that the area of the distant country to be supplied is so much greater than the District of Ganjam, that if the wants of the whole population were fully provided for, the home consumption of that collectorate would be comparatively of little importance, and certainly would not be such as to make the amount of tax, or monopoly price, the first object of consideration as it seems to have hitherto been. This will be apparent from the fact that the monopoly price, is now doubled by the cost of carriage in the first 45 miles, while much of the salt has to be carried 300 miles.

92. In making any arrangement with a view to increase the Revenue from salt, it is I think incumbent on the Government to keep in view the fact that whatever is done to facilitate the sale and reduce the cost, the great body of the consumers will never obtain so much as they require. The inhabitants of the inland districts will never be able to afford the same quantity in proportion to their numbers as is now consumed by the people of the coast and as they, one and all, pay the tax on salt they are dependents of the British Government whether inhabiting British territories or not. Apart therefore from considerations of humanity, they have a claim upon the Government which should induce it to make such arrangements as shall lead to the salt revenue being derived, from the sale of the greatest possible quantity. But this has not been by any means the case heretofore. The present state of things in Ganjam shews indeed a total absence of this consideration. The salt stores are close to the places of manufacture, however inaccessible they may be. The approaches to them are unimproved. The quantity manufactured is kept so low that a bad season leaves the consumers with a supply more than ever scanty and consequently at a famine price. The quality of the salt offered for sale may, or may not be fit for distant carriage, and there has been no sufficient economy of the time of those who come from the interior to purchase. The principle upon which the salt monopoly in passed years has been managed, has been such as might have been expected from a trader, who had no capital and looked to obtain what profit he could without it from those who were driven by necessity to purchase from him.

93. This system has been unfair to the inhabitants and most impolitic as a measure of economy on the part of Government whose interest would have been better served if every effort had been made to suit the want of its customers, and extend the sale. If in short, the sale had been carried on with the vigour and enterprise of a private trade with all the capital required at hand. I am quite aware that it is the wish of the Government to act upon the opposite principle now, and that it is anxious to remove the existing impediments to the trade, and increase as far as

circumstances will admit the quantity sold, and I am most anxious to see that principle acted upon in Ganjam for the reasons above stated.

94. To reduce the cost of carriage into the interior the communications must be improved where water carriage cannot be had, cart roads must be opened, and either these communications must terminate at the places of manufacture, or the stores of salt must be removed from them to the lines of communication. The latter will I have no doubt in all cases be found most advisable, as the salt is made in swamps, where, even if practicable communications are opened, no interchange of goods is likely to take place, and it never can be advisable to have wholesale shops so situated.

95. I have elsewhere said that salt is required as a return load for the produce of the interior brought to the coast. This is no where more remarkably the case than it is in Ganjam, which has an active export trade, and no important, nor any coast manufacture but salt, which is in sufficient demand to balance the weight of goods brought to the ports for shipment, a return load where water carriage is used would probably reduce the actual cost of carriage about half a pie a ton a mile, and it would even in that case be worthy of consideration, but in the case of cart carriage, which will be the best means of conveyance for the goods passing between the interior and the coast for many years to come, the saving will not be less than 4 pie per mile even when the roads are placed in a thoroughly efficient state. And as the saving bears a proportion to the expense of carriage, till the roads are in order, it will be greater still. Even 4 pie is a difference greater than would be effected by the change from good common roads to the cheapest Railway or by any expenditure in perfecting the vehicle used. And it is thus evident that the provision of a return load is one of the most important remedies that can be applied to the present depressed state of the interior of the country.

96. As salt will be a return load for the produce of the interior, so that produce will be a return for salt, and when the interchange is complete, the cost of carriage will be at its minimum, and the sale of salt at its maximum. To this end I propose that there should be depôts of salt at all the ports, and that eventually, none should be kept, either in the swamps, or off the main lines of trade.

97. At present the great carriers of salt are the Binjarries, upon whom the people of the country beyond the Ganjam frontier are entirely dependent for their supply. These people now bring very little of the produce of the interior to the coast, and the whole charge for their going and coming has to be paid by the consumers of salt, who have also to pay for the loss of time occasioned by the swamps being impassable after the rains end, frequently many thousand head of cattle are then brought together, which are detained for weeks while the swamps dry. I have no account of the numbers that have been so collected near the pans of Ganjam; but on one occasion at Buntamilly (a pan similarly circumstanced in Masulipatam) 40,000 head were waiting for several weeks, and on the swamp becoming passable, two months were occupied in loading them.

98. This peculiar race of people travel very short marches daily, and trust entirely to the forage they find in the waste lands of the country they traverse. On some few lines of road, where they are engaged in carrying cotton and other produce from a distance, the inhabitants oblige them to purchase forage, by cutting and stacking the grass when the monsoon ends; and destroying all they cannot cut: but the Binjarries are not so ill-treated in general; and in countries dependent upon them for salt they are rather a privileged race. Carriage by the pack oxen of the Binjarries is more expensive than by the worst country carts, on the worst roads, which appears at first, as a comparison of the men and cattle employed unaccountable; but on further investigation it is evident that the mode of working the cattle without artificial forage is bad economy. To give them time to supply themselves with food, the march is rarely made more rapidly than at the rate of 5 miles daily; so that the time of the cattle is lost, and with it the time of the men also; and although any amount of consideration for the cattle is shown when rest and additional grazing time are supposed to be wanted, whole droves of hundreds are sacrificed from parsimony in the use of purchased forage when the grazing fails.

99. The number of cattle that load at Nowpada annually must be about 1,00,000 and as there is always a great press for salt at the end of the monsoon, they must accumulate in like manner in that neighbourhood also, when the season is late. But a still greater loss, and consequent charge as carriage results from the state of the country a few weeks later in the season, when the forage fails from draught, and fresh water is scarce. Then vast numbers of cattle die before they can reach again their grazing ground in the hills, and many more become unfit to bear their loads.

100. In the means of conveyance here described we have sufficient to account for the very limited sale of Ganjam salt, and the best promise of greatly enhanced receipts from this important source of Revenue where we take steps to improve them. We have this promise realized in Canara, where a judicious outlay on roads has led to the carriage of salt on carts, with such an increase in the quantity sold, that the profit pays a fair interest on the outlay; while the trade of the country has the advantage of the roads.

101. In Canara, the salt being imported by sea, was always stored in the ports, and as the produce of the country beyond the Ghauts was brought to them, by those who carried the salt as a return load the trade had always that advantage also: yet every step taken to facilitate the carriage and reduce its cost, was found to act beneficially on the sales. Thus the removal of the salt from the ports to the foot of the passes was found to answer: and even a change of position of six miles was in one case productive of profitable results. This was near the coast where forage was expensive, and in such localities every mile saved is of importance to the Binjarrie carriers. If such changes effected so much in Canara with its limited field of demand, it may be supposed how great the annual loss of Revenue has been in Ganjam while the salt has been shut up in the swamps.

102. Eventually the trade in salt will be independent of the pack oxen of the Binjarries but that will not be till the passes have been made practicable for wheels; and capital and enterprise have been found to construct carts capable of carrying some 20,000 tons a year, an average distance of about 200 miles. We cannot make our arrangements to suit that time, for the present we must look to the Binjarries as our principal customers, as they have been hitherto such as the people are, they are all important in the salt trade and if we study the interests of Government, and those of the people requiring salt far from the sea, we must suit our arrangements to them, and to do that, salt should if possible be supplied to them, not where it is now offered for sale, but at the foot of the passes, which are from thirty to fifty miles inland.

103. The opening of roads from the ports to the hill-country has commenced, and even now salt might be stored in several places most favorably for the Binjarries, if Government or private enterprise undertook the carriage so far, I have little hope from private enterprise in Ganjam at present. Salt is a perishable article and one that requires a considerable capital to trade in profitably; I have no doubt that it will some day be as much an article of general sale as grain, but the question is what can be done immediately to supply the millions waiting for salt, and give them the advantage of the roads as soon as they are opened. To do this I think the Government must set the example of enterprise, and employ its capital. If this is done instead of its interfering with trade objectionably, it will, I am sure, give new life to it, and as private individuals can work more economically than the Government, it may fairly be expected that the profits derived by Government will lead to a successful competition; on the establishment of which the Government may quit the field.

104. If stores were built by Government on the frontiers of the hill country they might be placed at the disposal of private traders who might be induced to purchase salt if it was not taxed till its leaving the inland stores. In former times contracts of great amount were made between the Government and the Binjarrie Chiefs who were proverbial for their good faith, and I think it probable that it would answer for the Government to enter into agreements with these people to give them salt at a fixed rate at the inland stores if they would take large quantities,

the rate either covering the cost of carriage or not as seemed in each case advisable. The Binjarries who have a natural antipathy to the Engineers and consider themselves a doomed race in consequence of cart roads being opened through the country, are quite aware of the benefit they would derive by their journey ending at the foot of the hills, and while I was in Ganjam they begged that a road for carts might be opened so far, in order that they might obtain salt without leaving their grazing grounds.

105. If the Government do not consider it advisable to give so much direct help as I suggest it will, I trust, at all events erect stores in all the sea ports, and as a temporary measure store salt also well clear of the swamps, with good branch roads to the depôts; or place it on the great north road where the roads from the interior cross that line.

Salt stores in the sea ports and out of the swamps.

106. As the roads and passes improve, the Binjarries will bring more of the products of the interior to the coast; and if salt is not supplied to them near the hills, they will deliver their loads in the ports, and salt will be purchased there: unless there are other depôts on the line they travel, further from the sea; in which case they will quit the ports and load there; for they will not remain near the coast longer than they can possibly help. In Canara wherever the Government established a depôt of salt the coast merchants located agents to purchase the produce brought from the interior. There was usually a combination of these agents against the Binjarries but their chance of good prices was little better in the ports, and they were in general too happy to change their loads and get into the Hills again. Wherever there is a change in the mode of carriage in such a trade as I am speaking of; there must be a transfer of the goods to a new owner; as the carriers from the interior are themselves owners and will never hire carriage however well it might answer to them to do so. In the selection of sites for stores it is therefore advisable to choose spots near large trading villages or Bazzars, if such can be found, and it might be worth while to place the stores even a few miles out of the direct line of trade to take advantage of such positions. On the line of the north road there must be many such commercial villages favorably situated for the Binjarries, nearly if not quite, on the lines of road leading to the ports, and very fairly provided as to forage and water where such villages cannot be found, sites for building might be given to merchants or their agents.

Commercial villages use wherever salt is stored on the trading lines.

A change of carriage will only take place where there is change of ownership.

107. If the Government form such depôts as I am now speaking of, which will be at no great distance from the pans, I imagine that the cost of carriage would not be added to the price of the salt, but a question might be raised as to whether that addition should be made if salt was stored for in the interior. This question may generally be treated simply as a question of economy, but where the extra sale caused by keeping the price down, will bring as good a profit to the Government as a less quantity sold at the enhanced price, it is I think incumbent on the Government to give the inhabitants the benefit of the reduced price. If the gain is the same in either case it would be denying the people a costless benefit to add to the price, and lessen the consumption, such an arrangement would be entirely contrary to the liberal principle upon which the Government is working in opening roads into the interior, the objects of which are to give the inhabitants of the inland Countries the advantages possessed by the people of the Coast District.

108. Where salt is carried by water I am confident that it might be stored free of all extra charge for carriage, trusting to the extra sale for repayment even if the depôts were in the very heart of the continent, but where the ordinary land carriage is employed the charge for carriage might be made, so that the Government would enter upon the trade on an equal footing with private dealers who would have the advantage resulting from their more economical mode of working and eventually taken the trade out of the hands of Government. In treating the two cases differently, my object is to give the consumers all the advantage that can be given to them without loss to the Government; with water carriage they need not be dependent upon private carriers and pay for carriage, with land carriage the Government may work to a loss if the charge is not made and the Government charge may be even greater than that of private traders. But as I have before said that charge should be determined upon the spot and on the principle of giving all the advantage possible to the consumers.

109. The Engineer Officer could give a good suggestion as to the most advisable positions for the stores and none should be built without his opinion being obtained, as his operations must regulate eventually the course of trade.

110. To give new vigour to the trade in salt it should be the sole duty of some Officers to study the impediments now existing to its sale and suggest the means most suitable in each locality for reducing the cost of it. If the Ganjam salt trade were taken up in this spirit and energetically pursued, it would be an act of charity to several millions and would undoubtedly bring its own reward in an immediate increase of revenue.

111. To do the best for the inhabitants inland, a new capital must be brought into use between the sea and the Hills. The Binjarries confining the use of their money and labour to the country within and beyond the Hills. To supply this new capital the Government might give salt to private traders at the cost of manufacture, leaving the extra cost or excise to be levied on the sale of the salt to the Binjarries. If such a contract was entered into with the Government by the merchants who purchase produce, they would barter salt for grain on the frontier, and pay the Government in money on the coast a very moderate security would be necessary in such a case and the extra sale of salt would cover all occasional losses.

112. There are many minor inconveniences and annoyances to which the purchasers of salt are now subjected and which might be removed by the appointment of an agent to manage the trade, who had no other duty to attend to. If such an Officer was fully impressed with the idea that his success was dependent upon his making himself agreeable to his customers, the arbitrary measures that have been forced at times would never again be resorted to. If I am rightly informed large numbers of Binjarries have been refused the salt of Nowpada till a stock in hand at Omerovilly was sold though that salt was so inferior and unfit for carriage to the market they supplied, that they preferred waiting any length of time rather than load their cattle with it. There are many less palpable losses and inconveniences to which the purchasers of salt are subjected; the sum of which must make every material reduction in the quantity sold, and it cannot be expected that the Collector or his assistants can give up so much of their time to the details of the trade as to meet the wants of the purchasers. They cannot as an agent should, place himself in the position of a private trader and study from day to day the wishes of his customers, and till that is done neither the Government nor the consumers will be treated as they ought. In recommending the appointment of an agent, I must however be understood to mean not one who would occupy himself in measuring heaps of salt but who would look into the trade far and near, that he might ensure every facility being given and every impediment removed.

113. My tour through Ganjam has impressed me most favorably as to the capabilities of the district, which far exceed those of the Presidency in general. It has a good soil, a formation of surface that not only gives tolerable security of abundance of rain but tends to a continuance of the supply in seasons when the less hilly countries are entirely without it. If it has not good harbours, it has a roadstead throughout its whole length, from which goods are shipped inexpensively, and one port at least is capable of great improvements. The rivers offer facilities for irrigation on a great scale, and will, if they cannot be navigated themselves, feed canals that will lead directly inland from the principal ports. On the coast, salt can be prepared in any quantity, at the cheapest rate, and there is a market inland for all that can be carried there.

114. The climate and soil of nearly the whole district is suited to the growth of sugar, for which there is even now a demand (for both home consumption and for manufacture for export) that would ensure the sale of all that was grown at the present highly remunerative price, even if four or five times the present quantity were produced. There is a certainty also of the demand increasing to meet any extension of growth because there are few countries in the world that can produce sugar at the price it bears in Ganjam. Inland from this district, is a country little known; but all recent accounts of it lead us to the conclusion that its importance has been greatly underrated. Bustar is now for the first time, under European supervision, and has already been visited, by a member of the Nagpore Commission, whose interest in it is sure to lead to its becoming an active and good neighbour. It will now be to Ganjam, what Mysore is to

Canara, and all that is required to bring that about, are roads to connect the two districts; works which would, I have no doubt, well repay their cost to either one country or the other.

115. The roads I speak of, are only second in importance to the irrigation. It is true that the coast district might become rich without any trade with Bustar, and roads into that country, are not so absolutely essential to its prosperity, as communication with the sea is to the inland province. But there is an urgent call for these roads, to change the character of the bordering country; to give security of life and property to the inhabitants of the frontier Talooks, and to extend the sale of salt. The Government of Madras has three reasons for opening roads from the coast of Ganjam, to the plains of Bustar, and even though that country did not join in paying the cost of them, their effect on the salt trade alone, would make them advisable undertakings as investments for the Government money. But as the value of them would be so much greater to Bustar and other parts of Nagpore, and the doubt which hung over the value of such roads in the minds of some (before the Canara passes were opened for the benefit of Mysore) no longer exists, we may begin our portion of the work with a certainty of its completion by our neighbours. It is difficult to understand why a greater effort has not already been made to open roads through the Goomsoor, and Kimeddy Hills. Every one has allowed that they are the only remedy for the brutal customs of the Khonds, a counteract which we are every year spending large sums upon the Meriah agency, and every fresh out-break in the Hills shows that without them, our police, and even our troops, are almost powerless. One grant was made for money to open a pass from Russelcondah, but the unhealthiness of the country sent the Officer employed upon the work to Europe; and since that time no further steps have been taken to carry on the road.

116. The true reason for the absence of these important works is probably to be found, in the same cause which closed the last attempt. The terrible fever in the Hills has been too much for the zeal of those who have traced the roads in the plains, and the difficulty of finding labourers who would risk their lives in the execution of the work, has satisfied them that there was no use in making the attempt. The fever in that part of the country, is indeed of the most fatal character, and the climate is only free from malaria during a very brief period yearly. This will no doubt be found a great executive difficulty, but I have had much experience in the jungle of Malabar and Coimbatore, and I feel confident that money may be made to remove this difficulty as well as others; and I believe that by management the passes may be opened without the sacrifice of life. I have never recommended an attempt to work in spite of fever; my plan has always been to press on the work when the jungles were safe, and though the healthy season is shorter here than it is in Malabar, I would do the same here, calculating that the cost of the work would be somewhat greater than on the Western Coast; what I propose is, that a body of coolies should be enlisted and organized, for the public works of Ganjam; and that they should be employed on the passes only when the hills are most healthy. Having such a body of men at command, they could be brought to the pass on the day appointed, and leave it when the season ended, and in the unimproved condition of Ganjam, there will be employment enough for them in healthy parts of the district throughout the year; so that there need be no great loss of their services at any time.

117. I am quite aware that corps of coolies have been declared a failure, as more expensive than the common labourers of the country, employed as occasion required upon the public works, I am not however prepared to admit this. I do not think that any corps has been sufficiently well organized, and disciplined, to make the trial a complete one. I have seen gangs of prisoners, under good management, become so skilled in road making that their services were of more value than an equal number of coolies, even when the latter were paid by the quantity of work done; and I have not a doubt that the superior skill of practised men in such a corps as I suggest, would more than counterbalance the skulking and malingering, which I admit to be inseparable from such a corps. At all events, I am confident that by such means the Ganjam passes might be opened, and that the

In the passes, a corps of coolies would be economical. extra cost (if there was any) would be less in amount than the expense occasioned by loss of time, waste of superintendence, and risk of life, that would be occasioned by attempting the works with common coolies collected on the spot. I would at once enlist 500 men for the Government talooks, and 300 men for the Kimeddy estate, and when they were at work, I would employ with them, all the volunteers from the hill country that could be induced to join the working parties. This I think would lead in the course of time to the Sowrahs, and others taking service in the corps, which would gradually weaken their attachment to their chiefs, whose influence over them is productive of nothing but evil. The success of the corps would depend in no slight degree upon their officers and I have great confidence in recommending their trial at the present time in Ganjam, for I know no one who could be better entrusted with the general control of them, than Major Birdwood, whose temper and judgment in the management of men has always made him a most effective and popular commanding officer. He has several officers under his orders who could assist him to organise them, though he would require distinct officers for the command of them permanently; and if he gave his assistants, or executive officers, for that purpose, he would require others to replace them.

118. Since I left Ganjam I have received a letter from Lieutenant Harrington saying that Lieutenant McNeil who is in charge of the Meriah sacrifice agency, is willing to undertake the opening of a road from Russelcondah to the foot of the Coorminghia Ghaut, if money can be given to him for the purpose. Major Birdwood will address the Chief Engineer on the subject and I hope the sum required can be allowed, for the work is of the greatest importance: and Mr. McNeil (who was in the Sapper corps for a time) having some local knowledge, and influence, may be able to get the work done well, and expeditiously. This agency has now been at work for many years, and the sum spent upon it has been enormous. It was appointed from true humanity and kept up on the same account, with unbounded liberality; the sum spent may too, for all I can say to the contrary, have been laid out with judgment; and a temporary check has, I believe, been given to the abominable practice it was instituted to suppress. But if there is any truth in the voice of the country, no material effect has been produced by it on the character of the Hill people; and if such is the case, it may be found that the Agent will have taken his first step towards the permanent correction of the brutal customs of the Khonds, when he gives up his time to road making.

119. The passes most urgently required are, one or perhaps two at the head of the Palcondah valley (these are I suppose in Vizagapatam); one in the Kimeddy estate above Buteley; one North-west of Kimeddy, and two from Russelcondah; one of which is the Coorminghia Ghaut above alluded to. Passes fit for carts should be opened immediately at these points as soon as good lines can be traced, and the first employment of the Corps might be on the Buteley and Coorminghy lines. I may here express my conviction that the presence of such a body of Government labourers would be as effective as a Sibbundy Corps, in the prevention of such outbreaks as that which is now causing a loss of life and property in Kimeddy. Had such an organized body of men been engaged upon the Buteley road, in all probability the Sowrahs would have been working with them, and indifferent to the call of the Dundasura or if not, they would never have attempted to rise so weak as they were in numbers, while so large a party well acquainted with the country was close at hand. The effect of these roads through the Hills, will be to destroy the power of the petty chiefs, and give freedom to their dependents; which will lead to an inter-communication with the plains and an introduction of new habits. The chiefs will not at first approve of the roads being opened, as they will see correctly enough what their effect upon themselves will be. They will imagine too a thousand consequences as terrible in their minds as the "Zillah Court" that the Coorgs pictured to themselves as the first procession that would ascend the Perimhaddy pass; but some trifling luxury brought more cheaply into their country, will make them forgetful of their original fears; and as a reduction in the cost of saltfish, on one Ghaut being opened, made the Coorgs urgent for more passes, in spite of the dreaded Judge; so the Sowrahs and

Khonds will shortly take an interest in the roads, and be no less anxious than their neighbours to turn them to account.

120. In a former part of my notes, I have alluded to the export duty as a means of paying the cost of working, and repairing the roads; and I think that a continuance of that tax would be more advisable than a toll, if any direct receipt from them is necessary. There will be a great outlay on the roads of Ganjam, and their effect on the land revenue will be very slow, indeed that source is much too uncertain to be trusted in districts so circumstanced, and some other returns must be sought for. The objection to a toll is that the carriers who are of a poor class, have no money, and the effect of it may be the same as was caused by the transit duties in Mysore, where the produce could not be moved by the producers. The merchants on the coast have money, and it will make no difference to them whether they pay for the roads by an increase on the cost of carriage or on an export duty. I admit the advisability of free trade, but as money must be raised to pay for roads, and the trade cannot be free of all charge, it will in my opinion cause less interference with the traffic of the country, if every restriction is removed from its carriage to the ports. But I hope in Ganjam it will not be long before a better arrangement of the salt trade, and the further extension of the sale of that article; by improved communications, will make the Government independent of all direct tax upon other goods carried by land, or by sea. When the passes are open, I am confident that we may trust to the salt in that district, for an increase of revenue, so far exceeding the cost of the roads, and canals, that we need not impose either a toll or an export duty; and I hope till then we may have the latter as it now exists, rather than any toll however light. Now that each Civil Engineer has only one district to give his attention to, the capabilities of the country will be soon learnt. Major Birdwood has already a clear view of the wants of Ganjam, and will I am sure supply them as fast as money is placed at his disposal.

121. While travelling through Ganjam, I discussed with Major Birdwood the most advisable subdivision of the district for the Executive Officers, when the work is taken up by the Engineer Department; and it was determined, that one Officer should take charge of the valleys of the two southern rivers (the Nagalea and Calingapatam river;) one Officer Kinedy and the Talook that lies between it and the sea while it is in the hands of Government. One or two, (if two are to be had) for the valleys of the rivers Rushkoolea, and Mahonuddy, and for the Government lands in the north. This is a well defined division, and would ensure the works both of irrigation and communication being carried out systematically. Major Birdwood has already several very valuable Executive Officers, and he could I think take up the work at once, with a very moderate additional subordinate establishment. Though Lieutenant Harrington would manage one of these divisions admirably I should be sorry to see him relieved from the general duties of the district, as he has a thorough knowledge of it, and he would be an invaluable Assistant to Major Birdwood in the organization of his new department, and the instruction of the local Officers on their taking charge of the subdivision.

(Signed) F. C. COTTON,

Deputy Chief Engineer.

Fort St. George, }
12th July, 1856. }

(True Copy)

C. E. FABER, COLONEL,

Chief Engineer.

APPENDIX.

Statement shewing the Value of Exports and Imports by Sea as well as the amount

of duty levied on them in the district of Ganjam during the last eleven years.

Official years.	Value of Exports.						Total.	Amount of duty on Exports.						
	Ganjam.	Munsoor-cottah.	Sonnapore.	Barwah.	Poondy.	Calingapa-tam.		Ganjam.	Munsoor-cottah.	Sonnapore.	Barwah.	Poondy.	Calingapa-tam.	Total.
	Rupees.	Rupees.	Rupees.	Rupees.	Rupees.	Rupees.	Rupees.	Rupees.	Rupees.	Rupees.	Rupees.	Rupees.	Rupees.	Rupees.
1844-45... ..	20,230	1,98,835	28,660	12,674	71,396	1,05,307	4,37,102							
1845-46... ..	1,84,863	4,08,767	86,931	6,167	1,43,478	1,08,638	9,38,844							
1846-47... ..	2,16,514	5,38,519	1,24,649	9,395	1,72,111	3,63,225	14,24,913							
1847-48... ..	98,234	3,77,343	82,286	14,481	98,323	1,52,704	8,23,371							
1848-49... ..	93,379	2,38,728	90,175	20,976	85,799	1,06,712	6,35,769							
1849-50... ..	2,23,848	3,48,741	50,168	14,267	94,907	1,83,360	9,15,291							
1850-51... ..	4,04,039	4,14,095	69,799	27,568	2,02,289	3,20,970	14,38,760		2,460	1,083	713	862	6,987	12,105
1851-52... ..	2,82,593	5,08,576	45,974	12,223	2,08,747	3,27,390	13,35,303		2,418	261	15	454	9,478	12,636
1852-53... ..	1,15,109	5,77,602	73,839	25,576	2,32,898	5,93,136	16,18,160	2,531	3,257	106	41	5,000	22,724	33,659
1853-54... ..	2,29,603	4,23,031	70,107	13,162	2,02,631	4,52,492	13,91,026	4,196	3,570	1,229	402	893	18,835	29,125
1854-55... ..	2,77,184	3,48,901	81,189	42,503	4,43,851	1,64,001	13,57,629	2,416	2,533	696	90	2,686	3,577	11,998
Value of Imports.								Amount of duty on Imports.						
1844-45... ..	3,729	11,657	466			14,600	30,452							
1845-46... ..	2,846	17,313	1,629		9,109	35,280	66,177							
1846-47... ..	2,378	30,577	7,149		2,897	14,826	57,827							
1847-48... ..	3,198	22,885	11,926	2,999	3,081	14,276	53,365							
1848-49... ..	1,145		2,292		4,307	16,979	24,723							
1849-50... ..	463	4,657	5,027		11,827	11,110	33,084							
1850-51... ..	394	11,122	5,685		5,175	14,011	39,387						53	53
1851-52... ..		65,353			12,962	12,718	91,033					14	29	43
1852-53... ..	1,192	20,474	10,250		7,008	6,281	45,205		60				6	66
1853-54... ..	6,963	7,430	7	505	6,377	10,769	32,051	2					7	9
1854-55... ..	19,316	2,05,792	2,847	150	39,282	11,133	2,78,520						10	10

(True copy)

C. E. FABER, S.O. 10. 11.

Chief Engineer.

APPENDIX B.

List of Ports in the Ganjam District with their Harbour and Sea Customs Establishment.

No.	Names of Ports.	Pay of Goonastah.	Pay of Peons at 2 Rs. each.	Saderward, (Oil, &c.)	Total.
1	Ganjam...	12	4	6	16
2	Munsoorcottah...	14	4	6	18
3	Sonnapore...	10	4	6	14
4	Barwah...	7	2	6	9
5	Poondy...	10	4	6	14
6	Bavanapudoo...	7	2	6	9
7	Calingapatam...	14	6	6	20
	The Hoozoor Establishment...	17	8	6	17
	Ruppes.....	91	20	4	119

(True Copy)

C. E. FABER, COLONEL,

Chief Engineer.

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APPENDIX C.

Memorandum of Port dues (Tonnage duty) levied at the Ports of Ganjam District.

Names of Ports.	Tonnage duty.				
	1850-51.	1851-52.	1852-53.	1853-54.	1854-55.
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
Ganjam	457 15 3	278 9 0	207 1 6	394 11 6	455 13 6
Munsoorcottah	433 1 8	369 10 6	453 14 3	345 12 6	349 3 0
Sonnapore... ..	140 15 0	97 4 6	120 14 3	222 12 0	86 4 6
Barwah... ..	55 3 0	15 10 6	26 4 6	30 9 6	29 4 0
Poondy... ..	279 11 11	277 10 5	302 5 3	231 5 5	384 1 7
Calingapatam	588 12 2	619 7 10	1,170 13 9	832 13 8	434 9 6
Total.....	1,955 11 0	1,658 4 9	2,281 5 6	2,058 0 7	1,739 4 1

(True Copy)

(Signed) C. E. FABER COLONEL,

Chief Engineer.

No. 2050.

Ordered that the above Report do lie over for the present.

Fort Saint George,
4th November 1856.

(Signed) T. PYCROFT,
Chief Secretary.

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