277

NIGERIA.

FURTHER CORRESPONDENCE

RELATING TO

RAILWAY CONSTRUCTION IN NIGERIA.

(*In continuation of* [Cd. 2787] *December*, 1905.)

Presented to both Houses of Parliament by Command of His Majesty.
March, 1909.

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NIGERIA.

FURTHER CORRESPONDENCE

RELATING TO

RAILWAY CONSTRUCTION IN NIGERIA.

No. 1.

SIR W. EGERTON to COLONIAL OFFICE.

(Received June 27, 1906.)

SIR, S. S. Tarquah, June 26, 1906.

I HAVE the honour to transmit herewith a memorandum on railway and road construction in Nigeria for the consideration of the Secretary of State.

I have, &c.,
WALTER EGERTON.

Enclosure in No. 1.

MEMORANDUM on Railway and Motor Road Construction in Nigeria with Proposals for Loan Works to be at once undertaken.

The three British Administrations which up to the 1st of May formed Nigeria were:—

(i) The Colony and Protectorate of Lagos. Annual revenue (exceeding) £400,000
(ii) The Southern Nigeria Protectorate. Annual revenue (exceeding) 570,000
(iii) The Northern Nigeria Protectorate. Annual revenue (estimated) 85,000

The figures for the first two are below the actual receipts in the 12 months (1905-6). For the calendar year 1906 they are expected to reach £1,000,000.

2. On the 1st of May last the Administrations of Lagos and Southern Nigeria were unified with headquarters at Lagos. It is generally expected that in the near future the administration of Northern Nigeria will be added to the task of the Governor residing at Lagos. The Southern Nigeria scheme of administration has been designed so as to allow of the extension of the area under its control with the minimum of disturbance of existing arrangements.

3. Lagos Colony has, unaided, built a 3-feet 6-inch gauge line to Ibadan (124 miles), and is continuing that line to Oshogbo (187 miles). Another extension of only 60 miles would bring this line well over the watershed between the sea coast and the Middle Niger to Ilorin. The Middle Niger at Jebba, or Port Ilorin, would be reached by a further extension of about 56 miles. The cost of these extensions may be placed at about £6,000 a mile, or say:—

Oshogbo to Ilorin	£360,000
Ilorin to Jebba	336,000

or, to complete the long-wished-for railway from the sea to the Middle Niger, about £700,000, entailing an annual charge for interest and sinking fund, at 4 per cent., of £28,000. The Legislative Council of Southern Nigeria at a meeting held just before my leaving the Colony, on a motion brought forward by an unofficial member, have unanimously asked that the Secretary of State will allow the Colony to construct this line at once, and to raise the necessary loan to provide the funds required.

4. The line must, of course, be continued on the improved standard adopted for the Ibadan-Oshogbo extension (maximum grade of 1 in 80, compensated, and no curve of less radius than 10 chains). This is essential for a line which is being chiefly constructed to carry agricultural products over very long distances which cannot bear heavy freight charges.

5. The Construction Department organised for the Oshogbo extension may be expected to steadily increase in efficiency as the work progresses, and is in a much more satisfactory state than when the line was first commenced. This and the more open country, making survey and construction easier, the light rainfall and the absence of large streams should enable the line to be constructed for £6,000 a mile.

6. As to finance, it is surely unnecessary for me to bring forward any arguments to show that the Administration can easily meet the additional debt charge. We have a revenue in 1905-6—a year of great agricultural depression—of over £970,000, of which £75,000 had to be contributed to the needs of Northern Nigeria, and of which a very large amount was spent on extraordinary public works. We have the means of considerably increasing that revenue by additions to the Customs duties on spirits, tobacco, firearms, ammunition, and cotton goods.

7. In my humble opinion a great mistake has been made in yielding to the demands of the Imperial Treasury, and exacting from Southern Nigeria and Lagos large annual contributions from their revenues which might have been so much more profitably laid out—both for the inhabitants of those countries and for the Imperial taxpayer—in building railways and roads into the interior and thus hastening the development of the trade and with it the revenue.

8. In the correspondence on railway extension the immense possibilities for cotton production of Northern Nigeria are dilated on but it is nowhere pointed out with sufficient clearness that at Ibadan a thickly-populated cotton-producing country has been reached which has so far supplied *all the cotton existing ginneries can deal with*, and has done this in the face of considerable uncertainty as to the price paid to the cultivators. From all the accounts given me by persons who know the countries, there is no portion of the route between Ibadan and Kano that is as thickly-populated as the portion between Ibadan and Oshogbo, and it is probable that the country between Ibadan and Ilorin is capable of producing as much cotton as any other portion of the Kano line. If this is so, this is the portion, Oshogbo to Jebba, that should be first built, because:—

(*a.*) It is the nearest to the Port of Lagos, and, therefore, freight will be less.

(*b.*) It is well settled and peaceful, and interruptions to cultivation and losses from risings are unlikely to occur.

(*c.*) It is thickly populated by an agricultural race.

(*d.*) Its cotton-growing possibilities have been actually tested and have increased *pari-passu* with the ginning facilities.

(*e.*) The local Government can find the funds without assistance from the Imperial Government.

9. Ilorin is in Northern Nigeria. Endless trouble and friction will result if the whole line is not under one control. There will also be great economy in working it merely as an extension of the present Lagos line. Why not, in sanctioning the extension, transfer to Southern Nigeria all the territory to the south and west of the Niger, arranging at the same time that the £15,000 contribution now paid by (what was the Colony and Protectorate of Lagos) the Western Province of Southern Nigeria be cancelled in consideration of the Southern Administration assuming responsibility for the cost of administering this large portion of Northern Nigeria? If this were done, several very difficult questions could be easily solved, the cost to the Imperial Government of supporting Northern Nigeria could be at once lessened, and a step would be taken towards the desired goal of freeing it from pecuniary responsibility altogether.

10. The mercantile community of Lagos—native as well as European—is protesting—and, I must say, I sympathise with the protest—against the collection of tolls on goods taken from and to Lagos across the Northern Nigeria boundary. I am informed that the total realised by this vexatious tax at the toll stations on the boundary was only about £4,000 in 1905-6, and a portion of this (about 1/5th) has—in theory—been given up in 1906 as goods intended for export by sea are now allowed to be taken out of Northern Nigeria free. I say "in theory," because I fear that native traders will find it difficult to convince native toll collectors that their goods are intended for such export.

11. Well, one of the first acts of the Southern Nigeria Administration would be to abolish such tolls as by their abolition the local government is convinced that they would gain and not lose. A second difficult question which would then solve itself is the Niger Transport Service. The proposed service is from the mouth to Lokoja. It would then be under one administration and the efficient service which now exists to Onitsha and Idah would only have to be slightly prolonged.

12. Up to Lokoja, transit by the Niger should always be cheaper than by railway, but above that point railway transit should be cheaper. Moreover, as soon as the Lagos railway is extended to the Niger all the European firms doing business in that busy port are certain to open branch establishments on the Niger which will be supervised from Lagos. No Niger transport service will effect this on account of the difficulty of communication between Lagos and the Middle Niger by water. A senior in Lagos could neither spare the time to visit a station on the Upper Niger by the river route, nor could he supply his Niger branch with goods from his store in Lagos. The lengthy and intermittent communication by river would necessitate keeping large stocks at the factory on the Middle Niger and also, in all probability, a depôt at Forcados or Warri. This means, of course, large expenditure and confines the trade to large capitalists—as at present. Were there a large commercial town at Warri or Forcados it would be otherwise. There will be some day, but not in our time.

13. To open the Middle Niger to general commerce, to enable men with small capital, and men with large capital who do not wish to risk very much until they have ascertained what the Middle Niger trade is really worth, a railway direct from Lagos is indispensable. It should be possible to build that railway in three years if approval is given to raise the necessary loan. It can be done without danger of embarrassing the Southern Nigeria finances and without asking the Imperial Government for even a guarantee. At the same time as the railway, a road—not a West African road but a real road, properly graded and metalled, should be run from, probably, Oshogbo to Lokoja. The road would cost from £500 to £1,000 a mile, according to the country passed through and should have no gradient exceeding 1 in 20. It would give access by motor transport from Lagos to Lokoja in 2 to 3 days. It will from one end feed the railway and from the other take goods to and from the river. The country is rich. The Oshogbo end will run right through rich Ilesha and Ekiti country, to tap which the longer Oshogbo route was adopted instead of the direct Oyo route which, if the interests of the main line—instead of that of a district—had been considered would certainly have been adopted. The distance is about 150 miles through country which is devoid of water transport, and, therefore, inaccessible. Part of it is rich in oil palms, and all is as suitable for cotton cultivation as any part of Nigeria, and now produces considerable quantities. This road can be constructed by Southern Nigeria if the administration of this province is entrusted to the Coast Government. The road would pass through Kabba, the present seat of the Government of the district. I look upon the construction of this road as essential for the development of the country and the railway traffic. In addition, if the railway is not at once to be prolonged to the north of the Niger, a road should, at least, be constructed to Zungeru, about 100 miles from Jebba.

14. I have said nothing about bridging the Niger. Doubtless the approximate cost has been estimated, but I can find no statement on the subject in the papers in my possession, and in the absence of such estimate I hesitate to say more than that I consider a bridge most desirable, *even if the railway is not to be carried at once further into the interior*. The bridge should, of course, be designed to carry road as well as rail traffic on the same platform—the road being thrown open when trains are not running. A bridge will at once attract all the traffic for some distance up and down stream to it. Jebba is the point recommended by the Consulting

Engineers for the bridge. It seems to be the most suitable as it is higher up the river than the other sites proposed, and the higher the river is crossed, the better, for the more certainly will the railway transit of goods for places beyond be cheaper and quicker than transit by river. The length of the line to Kano also is very slightly longer by this route, and any branch to Kontagora and Sokoto would be much shorter. I do not think the question of transport by road in motor vehicles has been given the consideration it should receive.

15. A good metalled road should not cost more than £1,000 a mile. Where the road goes through natural laterite gravel the cost would not exceed £500 or even less. Putting the cost at £750, the cost of 300 miles of such road would be £225,000, representing an interest charge at 4 per cent. of £9,000. Upkeep at £25 a mile would be £7,500. Surely such a road would carry all traffic likely to be developed in *Northern* Nigeria during the next 20 years. I would not recommend any toll being placed on it, and, therefore, no direct revenue would be received as in the case of a railway. But would the railway revenue cover interest and working expenses for many years after its construction? Our experience in Lagos, where our line runs through far richer and more thickly-populated country, answers "No." After many years' traffic, we think ourselves very fortunate in covering working expenses, and—I write from memory—about 1½ per cent. on capital expenditure, leaving us apparent losers of some £25,000 a year on a line 124 miles long. Of course, the loss is only apparent, as the development of trade by the railway leads to much larger receipts in Customs duties and other branches of revenue. A road would similarly develope trade in Northern Nigeria—certainly to the extent of repaying the interest on cost of construction and maintenance; and, with the rapid improvement and cheapening of motor transport, it seems to me the best, if it is not the only, way of opening to trade a country of the size of Northern Nigeria in the absence of very large loans from the Imperial Treasury.

16. A road in many ways develops a country more thoroughly than a railway, for it gives access to every point of the country passed through, while a railway only taps the country adjacent to its stations. This is very noticeable in the Malay Peninsula, which, 25 years ago, had no roads or railways in it and now possesses over 2,000 miles of good metalled roads and about 400 miles of railways.

17. I consider that, with the terminus of the Lagos Railway at Jebba on the Niger—preferably on the left or north bank—and a good road thence to Kano and another to Sokoto, the possibilities of the country will soon be tested. All the much talked-of Tripoli trade would at once be diverted through Lagos, and as soon as that has been done and a considerable export of cotton established, a railway can be built without fear of its proving a financial failure and without the very large expenditure on interest and working expenses during the years that—if the Kano Railway is built now—must ensue before traffic receipts can be expected to equal interest on capital and working expenses.

18. Moreover, if further railways are to be built now, they should be built where they are likely to produce the greatest immediate development of trade, through the richest and the most thickly populated country. That is not in Northern Nigeria. The effect of a railway or a river is not very great more than 50 miles away from its course. The Niger and the Cross Rivers, the great waterways of Southern Nigeria, are over 100 miles apart. The country between, so far as known, is full of people. The lower portion is the richest in the oil palm known. As soon as that is left cotton-growing country is reached. Navigation on the Cross River, for all but very shallow boats, stops at Itu for eight months in the year. A survey for a railway from Itu into the middle of this populated and rich district is in course of being executed. From some point between the Niger and the Cross River the line should turn north with the intention of ultimately reaching the Benue, near Loko, and later being prolonged to the Bautchi country, where tin is said to be found in payable quantity. The line would, when the traffic justified it, be prolonged from Itu to Calabar, the finest port on the Bight of Benin, until the Lagos bar is removed. The fuller knowledge we now have of the country between Calabar and the Upper Cross River shows that a line through it would pass through almost unpopulated and mountainous country, would be most expensive to construct, and would have little traffic until prolonged *beyond* the Cross River.

19. It is the natural wish of the Imperial Government that Nigeria should become self-supporting as soon as possible. As stated at commencement of this

memorandum, Nigeria has hitherto been administered in three divisions, Lagos, Southern Nigeria, and Northern Nigeria. The two first have always been self-supporting. On the creation of Northern and Southern Nigeria in 1900 it was recognised that Northern Nigeria would require for a long time large outside contributions to enable the cost of administration of this large and, at present, unproductive territory to be met. It was laid down that the Secretary of State for the Colonies should estimate the amount collected by the other two Administrations in Customs duties on goods imported that ultimately reached Northern Nigeria, that this amount should be handed over by the Coast Administration to Northern Nigeria, and that the remaining funds required would be provided by the Imperial Treasury. Had this arrangement been adhered to, the Lagos Railway might now have crossed the Niger and a second line from Calabar be well on its way to the Benue and the alleged rich tin deposits of Bautchi; but the original arrangement was at once lost sight of, or intentionally set aside, and all that was considered was how much each of the Coast Administrations could afford to contribute to meet the needs of Northern Nigeria without embarrassing their own finances. This, especially in the case of the Southern Nigeria Protectorate has prevented the pushing forward of any large schemes for railway construction, while in the case of Lagos not only did the contribution, which had to be paid, make it more difficult to provide funds for interest on loans, but this difficulty was accentuated by the policy pursued in the Northern Administration of favouring the Niger route and imposing restrictions on the Lagos trade by caravans from the interior and by the numerous and enterprising native traders from Lagos.

20. I would most earnestly urge upon the Secretary of State that the only way of freeing the Imperial Government from the cost of administering the inland territories is to foster development from the coast, not to starve the Coast Administrations and to gradually transfer the burden to the Coast Administration, not by exacting a money contribution as at present, but by handing over Northern Nigeria, province by province, to the Coast Administration, as the extension of the telegraph, road, and railway systems renders this feasible.

21. The impoverishment of Southern Nigeria by the enormous contribution now levied has delayed, almost indefinitely, the pacification of the large area lying between the territory already under our control and the Northern Nigeria boundary. All the horrors that previously existed throughout Southern Nigeria still flourish there unchecked—slavery, human sacrifice, cannibalism, twin murder, tribal warfare, &c., &c. The country is thickly populated. Part of it is in the oil palm zone. As soon as that zone is left, the best portion, because the cheaper for transport, for cotton is reached. My advice is to reduce the Southern Nigeria contribution by £20,000. Spend this amount in increasing the military force and in quickening the pacification of the whole of Southern Nigeria (with our present force we have to move forward very slowly) and in constructing good roads, as we advance, through that great unknown district between the Cross River and the Niger, commencing at the same time a railway from Itu, on the Cross River, to be pushed into the middle of the tract between the Niger and the Cross Rivers and then northwards until it reaches the Benue at or near Loko. As soon as it reaches the Northern Nigeria boundary, the whole of the territory south of that river should be administered from the coast, and on its reaching the Benue (the Lagos Railway will by that time have reached and probably crossed the Niger) the whole territory can be administered from the coast, and it should be possible to considerably reduce the military expenditure. From where this line cuts the Benue I would build a good motor road for 150 miles into the middle of the Bautchi country. With motor traffic on this road it will be easy to exploit the much talked-of tin deposits, as well as to develop the agricultural and trading possibilities of the province, while the economical administration of the eastern portion of Northern Nigeria would be much facilitated.

22. The loan required for this line and road can be raised by the Coast Administration, and I believe that the development of trade, together with a judicious increase in the spirit duties will by that time have so increased the revenue as to enable the Imperial contribution to be reduced to less than half what it is now, and on the unification of the administration considerable economies should be possible. I have read much of the richness of Northern Nigeria and the greatness of its population. I cannot believe that the population there is nearly so

thick per square mile as that of the coast, or that, with its much drier climate, the crops can compare with those obtainable on the south banks of the Niger and Benue. Even for cotton the report of the experts sent to examine Northern Nigeria is in favour of the cultivation of the portions to the south of the two great rivers, and I believe that it is a fact that the great cotton-growing countries of the world are nearly all within 200 miles of the sea.

23. We should look on the whole of Nigeria as one country, not as two. If we do that, surely we shall decide to develop the richest, most thickly populated, and most easily accessible parts, first. Those parts do not lie in the *hinterland* of Northern Nigeria.

24. The Lagos-Jebba Railway and the various lagoons and waterways are sufficient to develop the old Lagos Protectorate, but this line is too distant to effect the Benin territories. They have, both at Warri and Sapele, excellent river ports, accessible to 5,000 tons steamers and continually visited already by steamers of this tonnage. Sapele is 35 miles nearer the interior, has unlimited deep water river frontage, and any railway from Warri to the interior would have to pass through or near Sapele and over the Sapele River; Sapele, though originally unhealthy, has now a very good health record. It is, therefore, clear that roads or railway to open the interior should start from Sapele. A survey has already been carried out for a railway—a light tramway—from Sapele to Benin City, a distance of about 30 miles. The country is flat and firm and construction would be easy. Either the tramway should be built or a good *metalled* road constructed. In either case a good road should be cut from Benin in a north-easterly direction for a further hundred miles. The country is rich in oil palms.

25. To sum up, my proposals for loan works are:—

(1) Harbour.—Purchase of dredger (already ordered) and immediate spending of £100,000 on moles to render permanent the present mouth of the harbour and facilitate dredging operations, and £50,000 in extending and strengthening the present Government wharf. Interest on this money and maintenance charges to be made good by a small charge of, say, 1s. a ton on cargo landed and shipped (probably 240,000 tons a year).

(2) Extension of railway to Jebba, £700,000.

(3) Motor road, Oshogbo to Lokoja, £100,000.

(4) Road, Jebba to Zungeru, 100 miles (by Northern Nigeria), £75,000.

(5) Railway from Itu, 50 miles north-westwards and then northwards to Benue, at or near Loko. Make first hundred miles of rail, £600,000; 100 miles of road, £75,000.

(6) Benin. Light tramway, Sapele to Benin City, 30 miles, say, £90,000; motor roads at £750 a mile, 100 miles, £75,000.

26. I have said nothing about establishment of motor service, as I think that could probably be effected from the savings on the estimate for road-construction or from revenue. Neither have I touched on free labour for road-making or maintenance. In most districts the population should be required to maintain, though I do not think they could be called upon to construct, the proposed roads. Nor have I said anything about improvements to the Niger transport service, as they can be effected out of revenue at no very great expense. This transport service can be developed gradually—as traffic develops—and does not necessitate any large initial expenditure. In this it is like a road motor service. Nor have I considered works in Northern Nigeria to be carried out by means of loans from, or guaranteed by, the Imperial Government. The above programme is one to be executed by the Southern Nigeria Government (except £75,000) by loans raised on the security of its own revenue. With assistance from the Imperial Government the railway might be extended by Northern Nigeria to Kano, or—and I prefer this—main roads for motor traffic might be constructed to Kano and Sokoto and the Bautchi mining district. As regards Bautchi I should like to add that I know nothing about the depth and richness of the tin deposits, but extraction and bringing the metal to market will be very expensive and the deposits need to be of quite exceptional richness to make their exploitation profitable.

WALTER EGERTON.

S.S. "Tarquah,"
June 26, 1906.

No. 2.

SIR W. EGERTON to COLONIAL OFFICE.

(Received June 27, 1906.)

[*Answered by No. 6.*]

SIR, S.S. "Tarquah," June 26, 1906.

I HAVE the honour to forward herewith a short note on works required to be taken in hand for the improvement of Lagos Harbour, for the consideration of the Secretary of State.

This memorandum should be read together with that* of the same date on railway and road construction in Nigeria.

I have, &c.,
WALTER EGERTON.

Enclosure in No. 2.

Short Memorandum on Improvement of Lagos Harbour.

It is difficult to understand how the removal of the Lagos Bar has been so long delayed. The tonnage of the import and export trade of Lagos is probably not less than 240,000 tons, and the shipping companies impose an additional 5s. freight on account of all cargo having to be transferred from the ocean steamers into smaller boats before it can be brought into Lagos Harbour. In addition to this, the time between shipment and receipt of goods is lengthened by from one to two weeks, and the goods are liable to much damage from weather and the rough handling they receive in the transhipment.

2. At 5s. a ton the amount levied on account of the transhipment is £60,000. Sixty thousand pounds represents the interest and sinking fund at 4 per cent. on a loan of no less than £1,500,000, and many years ago Messrs. Coode, Son, and Matthews reported that by the construction of moles costing £750,000, or one half this sum, the bar would be removed. The mercantile community would gladly pay 5s. a ton to Government instead of to the shipping companies; they would get their goods sooner and with less risk of damage, and Sir Alfred Jones, who controls the British lines carrying the greater portion of the trade, has stated that the actual cost to the shipping companies is far more than 5s. a ton.

3. Why, then, has the work not been carried out? I cannot say.

4. I have obtained the sanction of the Secretary of State to the purchase of a large dredger, and it is hoped that this vessel will be able to do useful work on the bar, and at any rate considerably increase the depth of water on it during some portion of the year. I consider, however, that we should not await the result of this work, but that the shore ends of the proposed moles should be at once commenced so as to render permanent the present mouth and channel, and thereby very greatly facilitating the work of the dredger.

5. The dredger will cost about £50,000. For another £100,000 very useful work—work that will probably be required in any case to maintain the improvement effected by the dredger—on the shore ends of the moles could be carried out.

6. The present Government wharf at Lagos is small. It is also of very fragile construction for the large branch steamers now used, and is quite unsuitable for the ocean steamers we hope soon to see entering the harbour. Moreover, it requires lengthening. I propose to spend £50,000 in strengthening this pier along its outer front—this will incidentally carry it into deeper water—and to prolong it. If the above is approved the money should be provided by loan.

WALTER EGERTON.

S.S. "Tarquah,"
June 26, 1906.

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* Enclosure in No. 1.

No. 3.

CROWN AGENTS to COLONIAL OFFICE.

(Received July 27, 1906.)

[*Answered by No. 7.*]

Whitehall Gardens, London, S.W., July 26, 1906.

Lagos Harbour.

SIR,

I HAVE the honour to enclose, for the information of the Earl of Elgin, a copy of a report which we have received from Messrs. Coode, Son, and Matthews, on the proposal to construct at once a portion of the mole on the east side of the entrance to Lagos Harbour.

2. We sent a copy of the report to Sir Walter Egerton before he sailed.

3. It will be observed from paragraph 21 of the report that in the estimate of the cost of the work the sum of £33,000 has been allowed for carriage of stone over the railway from Abeokuta to site, and that this amount has been arrived at by adopting a rate of 5s. 6d. per ton, the figure given by Mr. Glasier, the General Manager, as the bare cost to the Railway Department. In the event of the work being carried out, the Colonial Government will no doubt satisfy themselves when actual experience has been gained that the rate charged by the Railway Department for the haulage of the stone is not in excess of the actual cost, so that Railway may not profit at the cost of the harbour works.

4. One copy of the plan which accompanies the report has already been sent to Sir Walter Egerton, and no doubt taken by him to the Colony. I would therefore suggest that the copy now forwarded might be returned to us.

I have, &c.,
M. A. CAMERON.

Enclosure in No. 3.

Westminster Chambers, 9, Victoria Street, London, S.W., July 17, 1906.

Lagos Harbour—Proposed Mole on East Side of Entrance.

GENTLEMEN,

AT the interviews which we have had here with Sir Walter Egerton with regard to Lagos Harbour, the construction of a portion of the proposed rubble mole on the eastern side of the entrance has been considered.

2. In the reports which we have submitted to you on this subject in April, 1892, again in October, 1893, and in June, 1898, the construction of the mole works at the entrance was fully considered, and the benefits described which there is every reason to believe would result therefrom.

3. We gathered from Sir Walter Egerton that the sand accumulation at the extreme southern point of the eastern horn of the entrance, known as Reeve Island, has, to a considerable extent, disappeared; and in consequence of this change a portion of the ebb tide, which formerly was concentrated over the bar, tending to the creation and maintenance of the depth thereon, now escapes laterally over this lowered sand bank.

4. In a further report on Lagos Harbour, which we submitted to you on 22nd August, 1904, in paragraph 31 we stated that after carefully reviewing the whole position, we unhesitatingly recommended that the only effective and permanent mode of securing the sand accumulation on the eastern point of the entrance is by the adoption of a bank of rubble, in conformity with the recommendations in our report of April, 1892, and again in our report of June, 1898.

5. We likewise pointed out that the effect of the construction of this training mole would be that the sandbanks, which are now liable to frequent and irregular movements, dependent on the action of the sea and of the outgoing currents, would accumulate at the back of the training mole, and thus become fixed in their position.

6. We have laid down on the accompanying chart,* in brown colour, the high and low water marks, showing the sand accumulation known as Reeve Island, as it existed on 30th November, 1903.

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* Not reproduced.

7. As above stated, this growth has now been considerably changed and reduced in extent, to the detriment of the depth in the entrance and over the bar.

8. We have also indicated by red colour on this chart the portion of the mole which we would recommend for construction in the first instance, viz., for a length of 3,800 feet, which will, in our opinion, be sufficient to fix the sandbanks at the eastern horn of the entrance, and to train the currents in the direction of the bay, thereby aiding the work to be done by the dredger to the fullest extent practicable, for what may be regarded as a minimum expenditure.

9. We estimate the cost of this length of mole, including the provision of the requisite plant for the construction of the same, at £150,000, of which sum about £33,000 will be required for the purchase of the plant necessary for the opening out and working of the quarry at Abeokuta, from which the stone would be obtained, for the plant which is required for the construction of the mole itself, and also for the floating plant necessary for conveying the material from Iddo Island to the site of the works, as referred to below.

10. The mode of procedure we propose for carrying out the work is as follows: The granite rubble would be procured, as above stated, from a quarry site near the railway at Abeokuta. It would be conveyed from thence over the Colonial Railway to the new wharf at Iddo Island, the stone being taken in wagon bodies, or boxes, on the ordinary bogie trucks used on the Colonial system.

11. On arrival at the new wharf, southward of Iddo Island, these laden wagon bodies would be placed on board barges lying alongside, which would be towed from thence to a jetty to be erected at about the point marked X on the accompanying plan, near the inner end of the proposed mole. Here they would be discharged, placed on underframes and wheels and conveyed by locomotives to the site and tipped.

12. We do not consider that a temporary staging will be necessary for the length of mole referred to, but for the construction of the outer portion of the mole, probably from the point Y outwards, when required hereafter, a staging may possibly be found necessary for the tipping of the stone, with a view to the economical construction of the mole, consequent on the command which such a staging would afford in the spreading of the rubble over the sand foundation and in feeding the same subsequent to depositing, as may be found to be necessary.

13. It may be that before the proposed mole arrives at the point Y, where it begins to feel the influence of the outgoing current, tending to turn to the eastward, a temporary staging may with advantage be employed, say for the construction of the outermost 500 or 600 feet of the length of the work.

14. It should be borne in mind that the plant which will be necessary for the construction of the length of mole of 3,800 feet now proposed will also be available for the further prolongation of this work when required hereafter.

15. We have no doubt as to the satisfactory results which would follow the construction of this work, with regard to the more direct impingement of the outgoing current on to the bar and through the entrance channel, the fixing of the line of the scour, and the prevention of the lateral escape of a large volume of water which now passes to the eastward without going over the bar, or aiding in the maintenance of the depth thereon.

16. We estimate that the time occupied in the preparation of the plant for these works would be not less than six months, and that the actual work in connection with the mole would not commence before about eight or nine months from that date.

17. In the meantime the quarry at Abeokuta might be opened out with advantage, so that the delivery of stone for the mole might commence as early as practicable after the tipping wagons, barges, and special plant have been delivered.

18. In our report of June, 1898, paragraph 23, we stated that Mr. Shelford had estimated the rate at which stone could be delivered over the Colonial Railway from Abeokuta at 3s. 4d. per ton, the Harbour Works finding and maintaining the wagons, but the Railway Department bearing all other charges.

19. Mr. Shelford, in a letter which he wrote to us on the subject, intimated that he assumed, in framing this comparatively low estimate, that everything would be done, both by the Railway Department and the Harbour Works Department, to work the traffic in the most economical manner, and that the total amount would be carried with tolerable regularity at the rate of about 100,000 tons per annum.

20. In connection with the preparation of this report and the proposal therein made for the construction of the inner portion of the east mole, we have had an inter-

view here with Mr. Glasier, the General Manager of the Lagos Railway, when he produced figures, based on his experience of the working of traffic at Lagos, from which it appeared that the rate per ton for conveying the stone from the quarry at Abeokuta to the wharf at Iddo Island, including the provision and maintenance of the under-carriages required to convey the wagon bodies to which we have referred should not be less than 5s. 6d. per ton, to cover the actual cost to the Railway Department, it being assumed that the figure in question leaves no profit to that Department.

21. In our estimate of £150,000 for the length of mole referred to as shown on the accompanying chart, including the provision of the plant, say £33,000, we have adopted this price of 5s. 6d. per ton for the cost of the conveyance of the stone by the Railway Department, under the conditions just described.

22. We understand from Mr. Glasier (and this was partially confirmed by Sir Walter Egerton) that a Government tug would be available for towing the barges from Iddo Island to the inner end of the mole and back again, when required, so that the item of £33,000 above named does not include the cost of a tug, although it provides for the working charges in connection with the same, the use of the tug being assumed to be granted free of charge.

23. In view of Sir Walter Egerton's departure for Lagos on Friday next, we beg to recommend that this report and the accompanying chart should be forwarded to him at the Langham Hotel to-morrow.

We have, &c.,
COODE, SON, AND MATTHEWS.

The Crown Agents for the Colonies,
Whitehall Gardens, S.W.

No. 4.

CROWN AGENTS to COLONIAL OFFICE.

(Received August 4, 1906.)

[*Answered by No. 7.*]

Whitehall Gardens, London, S.W., August 3, 1906.

Lagos Harbour—East Mole.

SIR,

IN continuation of our letter of the 26th July,* I have the honour to transmit, for the information of the Earl of Elgin, a copy of a letter which we have received from Sir Walter Egerton on the subject of the proposed construction of a mole at the east side of the entrance to Lagos Harbour.

2. With regard to the last paragraph of our letter, as Sir W. Egerton has returned to us the copy of the plan which we sent to him, we do not now require the copy which accompanied our letter to be returned.

3. The Consulting Engineers have informed us that it will take about three years from the date of commencement to complete the work now contemplated.

I have, &c.,
M. A. CAMERON.

Enclosure in No. 4.

Sir WALTER EGERTON to CROWN AGENTS.

GENTLEMEN, S.S. "Tarquah" (Outward bound to Lagos), July 25, 1906.

I HAVE the honour to return herewith the copy of Messrs. Coode, Son, and Matthews's letter of 17th instant, with the accompanying chart of Lagos Harbour, forwarded to me in your memorandum of the 18th idem. The subject of Messrs. Coode, Son, and Matthews's letter is the construction of a mole, 3,800 feet long, on the eastern side of the entrance to the harbour, to fix the position of that entrance, and to lessen and facilitate the work of the large dredger now being built.

2. I have seen the Secretary of State and Mr. Antrobus, of the Colonial Office, on the subject of the proposed mole, and in a memorandum, dated the 16th of June,

* No. 3.

I requested Lord Elgin's approval of the expenditure of £100,000 on this work. Subsequent discussion with Sir William Matthews, in which he pointed out how much has necessarily to be spent on plant and on the construction of the unserviceable, but essential, land portion of the mole before the useful portion, extending beyond the foreshore, is reached, shows that it is advisable to spend not less than £150,000.

3. During the last year a considerable portion of the newly formed sandbanks, shown in brown on the chart, have disappeared, as well as the outer portion of the foreshore shown on the chart. Simultaneously with this disappearance, the depth of water on the bar has lessened by about two feet to approximately what it was before the formation of the banks. This deepening on the formation of the sandbanks and subsequent shallowing on their disappearance is direct confirmation of Messrs. Coode, Son, and Matthews's contention that the construction of the proposed 3,800 feet of the eastern mole will at once deepen the entrance and, therefore, lessen and facilitate the work of the dredger that has been ordered. It is hoped that it will keep the passage over the bar in a fixed position and prevent that constant change which now takes place. For effectual dredging it is most important that the natural channel should be fixed so that the work of the dredger may be simply that of deepening a natural channel instead of creating and deepening an artificial one that the tendency of the tides and ocean swell is to constantly silt up again.

4. I trust that it will be remembered that a charge on the trade of the port, equivalent to that now levied (5s. a ton on 240,000 tons) by the shipping companies on account of the enforced trans-shipment, owing to the inability of the ocean steamers to enter the harbour, would produce £60,000, or four per cent. on £1,500,000—ten times the sum now asked for and double the estimated cost of carrying out the complete scheme originally proposed by Messrs. Coode, Son, and Matthews. This is on the existing trade of the port. The removal of the bar could not but very greatly increase that trade.

5. I look upon the removal of the Lagos bar as even more important to Lagos than the extension of the railway. As soon as the bar is removed it can no longer be contended that access to Northern Nigeria by way of the Niger is easier than by a railway from Lagos. Moreover, much of the trade of the French Colony of Dahomey now passes through Lagos—viâ the lagoon, to and from Porto Novo, notwithstanding the inconvenience of the bar. When the ocean steamers can lie alongside the Lagos wharves, there can be no question that the Lagos route will be increasingly adopted.

6. Should it be necessary to carry out the whole, or even the greater part, of the complete scheme of moles, the work will take many years, during which the inconvenience and loss occasioned by the bar must continue. With every extension of the railway this is more severely felt. The recent shallowing of the bar prevents existing branch boats entering or leaving more than half laden. Every foot of extra depth obtained enables them to carry more cargo.

7. If a depth of only 17 feet—say, five feet more than at present—could be maintained, we should be at Lagos in the same position as Opobo, where the cargo is taken by the large ocean cargo boats entering light after discharging the bulk of their freight at other ports.

8. I hope you will be able to give Sir William Matthews's present proposals your strongest support. Surely there is no other port in the world where it is so clear that expenditure will repay itself and where harbour improvements have been so long delayed.

9. In conjunction with these mole and dredging works I consider an expenditure of £50,000 should be at once incurred in lengthening and strengthening the existing Customs wharf so as to fit it to deal with all the trade of the port. The present structure is in an unsatisfactory condition, is too short for the increased traffic, too fragile for the large boats now used, and quite unfitted for the larger steamers that may be expected as soon as the bar is deepened.

10. I have advised the Secretary of State, in accordance with your views, that it will be unnecessary to raise any loan for a year, or more, as you have expressed your ability to advance any monies required for some time to come.

I have, &c.,
WALTER EGERTON.

No. 5.

CROWN AGENTS to COLONIAL OFFICE.

(Received August 14, 1906.)

[*Answered by No. 7.*]

Whitehall Gardens, London, S.W., August 13, 1906.

Lagos Harbour.

SIR,

WITH our letter of the 26th July* we forwarded you a copy of Messrs. Coode, Son, and Matthews's report recommending the construction of a part of the east mole in order to preserve the depth of water on Lagos Bar after it had been dredged.

2. We pointed out that, in estimating for this work, the Consulting Engineers allowed 5s. 6d. per ton for the conveyance of the stone required over the Lagos Railway from Abeokuta as against 3s. 4d. per ton which was allowed in their report of the 30th June, 1898.

3. I now have the honour to enclose, for the information of the Earl of Elgin, a copy of a memorandum which we have addressed to the Consulting Engineers, asking what difference this rate would make in the estimate of £797,000 for the whole work, as given in the last-mentioned report, and also a copy of their reply, from which it will be observed that to carry out the whole of the works recommended in that report a sum of approximately £100,000 should be added to the estimate of £797,000.

I have, &c.,
H. MARTIN,
For Crown Agents.

Enclosure 1 in No. 5.

CROWN AGENTS to Messrs. COODE, SON, AND MATTHEWS.

(E. 309/5 B.)

Whitehall Gardens, London, S.W., July 30, 1906.

Lagos Harbour.

We request you to inform us, with reference to the 20th and 21st paragraphs of your report of the 17th July on the proposed mole on the east side of the entrance to Lagos Harbour, what effect will be produced on the estimate of £797,000 given in the 25th paragraph of your report of the 30th June, 1898, as the probable cost of the whole of the harbour works by the change in the rate for the conveyance of the stone over the Lagos Railway from 3s. 4d. per ton to 5s. 6d. per ton.

We shall be glad to know also how the time for completion given in the 24th paragraph of your 1898 report as 12 years will be affected if the east mole now proposed is completed before the construction of the remainder of the works is commenced.

J. C.

Enclosure 2 in No. 5.

Messrs. COODE, SON, AND MATTHEWS to CROWN AGENTS.

Westminster Chambers, 9, Victoria Street,
London, S.W., August 9, 1906.

Lagos Harbour.

GENTLEMEN,

WE have to acknowledge the receipt of your minute, E./309/5 B., dated 30th ultimo.

2. The total quantity of rubble included in the estimate of £797,000 given in our report of 30th June, 1898, was 1,317,750 tons, which would be subject to

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* No. 3.

an addition of 2s. 2d. per ton in consequence of the change in the rate for the conveyance of stone over the Lagos Railway. Recent information, however, respecting the condition of the extrance appears to permit of the East Training Bank being commenced, as far as can at present be determined, at 2,000 feet further seaward than previously contemplated, so that the quantity of rubble required for the works on the east side may not be so great as was anticipated when we prepared the estimate above mentioned.

3. We are, therefore, of opinion that approximately the sum of £100,000 should be added to the estimate of £797,000 for the construction *of the whole* of the works, as shown on the plan which accompanied our report of 30th June, 1898, in consequence of the increased cost of the conveyance of stone, and after deducting the saving in rubble previously mentioned.

4. With respect to the time required for the construction of the works referred to in our report of 30th June, 1898, we are of opinion that, if the further works are continued without material intermission, on the completion of the first instalment of the works referred to in our report of 17th ultimo, the time given in the 34th paragraph of our report of 30th June, 1898, would probably not be exceeded.

We have, &c.,
COODE, SON, AND MATTHEWS.

No. 6.

THE SECRETARY OF STATE to THE GOVERNOR OF SOUTHERN NIGERIA.

SIR, Downing Street, September 15, 1906.

I HAVE the honour to transmit to you, for record in the Colony, a copy of your letter of the 26th of June,* enclosing a memorandum on the improvement of Lagos Harbour, and a copy of correspondence† with the Crown Agents for the Colonies on the subject.

2. As you will see from the letter addressed to the Crown Agents by my direction on the 15th of September,‡ I approve of the construction of a mole on the east side of the entrance to Lagos Harbour for a length of 3,800 feet at an estimated cost of £150,000.

3. I approve also of your proposal to spend a sum of £50,000 on lengthening and strengthening the Government wharf in Lagos Harbour, and I request that you will submit to me definite plans or proposals for this work which can be examined by the Consulting Engineers.

4. You will learn from a separate despatch§ that I approve of the purchase of a small pontoon pump dredger for work inside Lagos Harbour and elsewhere at an estimated cost of £3,000.

5. The expenditure now approved in connexion with the improvement of Lagos Harbour is as follows:—

Dredger for bar	£50,000
Eastern mole	150,000
Government wharf	50,000
Pontoon pump dredger...	3,000
Total	£253,000

Subject to any observations which you may have to make, I am of opinion that the whole of this expenditure, with the exception of the £3,000 for the pontoon pump dredger, should be met by loan, the interest and sinking fund charges of which will be paid from the dues which you may find it possible to levy on those who benefit by the improvements, and I approve of your taking steps to introduce the legislation necessary to enable such a loan to be raised when a favourable opportunity presents itself. I understand that, pending the issue of a loan, the Crown Agents are prepared to make, on the usual terms, any advances which may be necessary

* No. 2. † Nos. 3, 4, 5 and 7. ‡ No. 7. § Not printed.

for carrying on the works, so far as uninvested surplus funds of the Colony are not available for the purpose.

I have, &c.,
ELGIN

No. 7.

COLONIAL OFFICE to CROWN AGENTS.

GENTLEMEN, Downing Street, September 15, 1906.

I AM directed by the Earl of Elgin to acknowledge the receipt of your letters of the 26th of July, 3rd of August, and 13th of August,* and to inform you that he has intimated to the Governor of Southern Nigeria that he approves of the construction of a mole on the east side of the entrance to Lagos Harbour for a length of 3,800 feet, on the lines proposed in Messrs. Coode, Son, and Matthews's report of the 17th of July,† at an estimated cost of £150,000. It is understood that this estimate includes the cost of the plant necessary for the opening out and working of the quarry at Abeokuta from which stone for the mole will be obtained; the cost of the plant required for the construction of the mole itself; and the cost of the floating plant necessary for conveying the material from Iddo Island to the site of the works.

2. Lord Elgin has also informed the Governor that he approves of the expenditure of a sum of £50,000 on lengthening and strengthening the Government Wharf inside the Harbour, and he has instructed the Governor to submit definite plans or proposals for this work which can be examined by the Consulting Engineers.

3. The expenditure of the following sums has now been approved by the Secretary of State in connection with the improvement of Lagos Harbour:—

Dredger for bar	£50,000
Eastern mole	150,000
Government wharf	50,000
Small pontoon pump	3,000
Dredger (as to which a separate letter‡ has been addressed to you).	
Total	£253,000

It is intended that the whole of this expenditure (excepting the £3,000 for the pontoon pump dredger) shall be met ultimately by means of a loan, and the Governor has been authorised to introduce the necessary legislation. But it is understood that, pending the issue of a loan, you will be able to obtain, on the usual terms, any advances which may be necessary for carrying on the works, so far as the accumulated balances of the Colony are not available for the purpose.

I am, &c.,
R. L. ANTROBUS

No. 8.

THE GOVERNOR OF SOUTHERN NIGERIA to THE SECRETARY OF STATE.

(Received November 13, 1906.)

MY LORD, Onitsha, October 11, 1906.

I HAVE the honour to forward herewith a report by Mr. S. G. Brounger, who

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* Nos. 3, 4 and 5. † Enclosure in No. 3. ‡ Not printed.

accompanied me on my journey from Ilorin to Zungeru on the country lying between Jebba and Barijuko on the Kaduna River.

2. I also enclose copy of a route report* by Captain H. A. Kempthorne, of the Northern Nigeria Regiment, of the same journey. Captain Kempthorne's sketch of the route will be forwarded as soon as copies have been made.

3. It will be observed that the country between the Niger and Jebba and the Kaduna River appears to offer no great difficulties for the construction of a line with the maximum grade of 1 in 80. The objective of such a line would not be Barijuko, but the Kaduna River at some point near the Zungeru Bridge. The trace of the railway would, therefore, deviate towards the north, from the route to Barijuko, at not less than 10 miles from Barijuko, and the whole distance to the Kaduna Bridge at Zungeru should not much exceed 100 miles. This strip of country between Jebba and Zungeru seems to have been little known as no route report from Jebba to Barijuko existed before, and the sheet of water near Tatabu which is, without doubt, a true lake, with streams running into it and only connected with the Niger during very high floods, was believed to be merely a creek running up from the Niger.

4. The whole country between Ilorin-Jebba and Jebba-Zungeru is thinly populated, but the villages, though small, are at fairly frequent intervals and the country all appears to be fertile and capable of cultivation and, where cultivated, the farm products grow well.

5. I would specially invite your Lordship's attention to Mr. Brounger's suggestion that, if the Lagos Railway is continued beyond the Niger, transit over that river should be by means of ferry and not by a bridge. The rough estimate of the Consulting Engineers for a bridge at Jebba is £87,000, and at any other place lower down, probably not less than a quarter of a million. More detailed examination of the Jebba crossing would probably lead to a considerable increase on the present estimate, possibly to as much as £150,000, while two ferry boats, capable of conveying engines and trucks across the river, should not exceed in cost £30,000, and could deal with all the traffic for some years to come.

6. It may be asked why, if a ferry would suffice, cannot the river be crossed at a point lower down so that the line might run through more populous country. I think the answer to this is that the line should now be taken to a point where a bridge can be built in the future, and, further, that there would probably be considerable difficulty elsewhere than at Jebba in working a ferry during the greater part of the year, owing to the extreme shallowness of the stream. A definite opinion on this point and of the advantages of alternative routes cannot be properly come to without detailed surveys of each route and especially of the various crossings of the Niger.

7. I suggest that the enclosures to this despatch be referred to the Consulting Engineers and that Mr. Brounger be authorised, on the completion of the Ilorin-Jebba Railway survey, to survey and collect full information regarding the Jebba crossing and also as to the possibility of crossing by bridge or ferry at several points lower down the river. This he could do in March or April next before proceeding on leave and, when on leave, the matter could be discussed again with the Consulting Engineers and your Lordship. I shall myself be due for leave about that time and could assist at the Conference. In the meantime, I hope that the staking out of the line to Jebba may be authorised so that full information regarding that section may be available.

I have, &c.,
W. EGERTON,
Governor.

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* Not printed.

Enclosure 1 in No. 8.

YOUR EXCELLENCY, Zungeru, October 1, 1906.

I HAVE the honour to hand Your Excellency the following report upon the feasibility or otherwise of an extension towards Zungeru of the line of railway now being surveyed from Ilorin to Jebba on the Niger River.

As will be seen from the report, the country to be passed through will, I think, present no difficulties which cannot be negociated by gradients of 1 in 80 and curves of 15 chains radius.

The country is, as a rule, rich in palm* and shea butter trees, and considerable patches of cultivation, consisting of yam and guinea corn with, here and there, fields of indigo and chillis, occur around most of the villages.

Cotton is also cultivated here and there, notably at a village called Bodi Sadu, where a particularly fine field of cotton was noticed.

Crossing of the River Niger.

Judging from my cursory inspection of the proposed crossing of the Niger at Jebba, which was necessarily limited by the short time at my disposal, and also by the flooded state of the river, I am of opinion that the construction of a bridge, necessitating a maximum span of some 1,100 feet would be an unnecessary expense to incur, and that, as an alternative scheme, the adoption of a steam ferry capable of conveying loaded trucks across the river without break of bulk would be in every way preferable.

Without further information at my disposal it is impossible for me to give anything like an accurate estimate of the cost of such a ferry; but, as a rough approximation, I consider that £30,000 would be amply sufficient for the work and that there would be no difficulty in dealing with the maximum traffic which might be expected for many years to come.

Steam ferries of the kind which I propose, are used in India, and are found, I believe, to work quite satisfactorily.

Before selecting the best site for a crossing, it will be necessary to examine the river bed at low water, which I hope to do about the end of this year, when I shall be in a position to give Your Excellency a detailed report and estimate of the proposed scheme.

Jebba to Tatabu 9½ miles.

Starting from the north bank of the Niger the road runs for some six miles through a thinly-wooded and easy country, passing the villages of Daiyarba and Giddan Zana, after which a series of deep ravines is crossed until the village of Tatabu is reached. Four small streams are crossed upon this section which should necessitate nothing larger than 15 feet openings, and indications of ballast are met with.

South of Tatabu a large lake, the size of which I roughly estimate at six miles long by one mile broad, lies more or less parallel to the road, its north shore being at this point about half a mile from the village.

Upon this section the railway would probably be taken some distance south of the road in order to avoid the ravines above referred to and to obtain easy gradients.

Tatabu to Bokanle 24 miles.

About three miles beyond Tatabu the village of Rawa is met with, near which the lagoon already mentioned ends, and nine miles further on the road passes through the large and apparently flourishing village of Mokwa, crossing a deep ravine immediately before entering the town. An outcrop of sandstone occurs upon the east bank of this ravine, which should prove most useful for building purposes and of which there appears to be a practically unlimited quantity available.

* In a subsequent despatch Sir W. Egerton states that this was a mistake. There are very few oil palms.

From Mokwa to Bokanle a thinly-wooded grassy country is traversed, in which occasional outcrops of laterite are met with. Upon this section the work will be extremely easy, with practically no serious gradients or curves, the bridging will be insignificant, and a supply of good ballast can be obtained throughout.

Bokanle to Charati 17 *miles.*

For the first two miles of this section the work will be easy, but throughout the next 12 miles a number of densely-wooded gullies are crossed which will necessitate heavy banks and cuttings and also a large number of small water openings. Indications of ballast occur, and quantities are probably obtainable within easy distance of the line, sufficient for all requirements.

This section of country is particularly rich in palms, shea butter, and cultivated farms.

Charati to Boboji 13 *miles.*

This section is fairly easy, but the country now becomes more broken and hilly and the first stream of any considerable magnitude (the Mutu) is crossed between the villages of Lagun and Boboji. This will probably necessitate at least a 50-foot girder bridge, but no difficulty is anticipated in dealing with the foundations. Good ballast is obtainable throughout.

Boboji to Tokuinji 15 *miles.*

Sandstone is again met with near Boboji which, if in sufficient quantities, should prove very valuable for building the numerous bridges and culverts which will be necessary on this section. The River Ebba, crossed between the villages of Kafeton and Marmousi, will require probably two spans of 40 feet, while, further on, the road crosses a series of swamps intersected by considerable streams which will necessitate somewhat heavy banks and several bridges of some 10 to 30 feet span. Judging, however, from the fact that the flow in some of the streams met with was alternately in opposite directions, I think it probable that the same stream was crossed more than once, and that a detailed survey may prove that a bridge for each will not be necessary.

On the whole the work upon this section will be fairly light, and there are indications of a plentiful supply of ballast throughout.

From Tokuinji the distance to Barijuko on the Kaduna River is some 10 miles; but before reaching this point it will be necessary to deviate the alignment of the railway more to the north in the direction of Zaria and no further recognizance has yet been made of the country to be passed through in this direction.

Barijuko lies some 22 miles down the river from Zungeru, so that the railway, whatever alignment were adopted, would have to traverse at least this distance before reaching Zungeru.

An excellent bridge has been erected over the Kaduna at Zungeru, upon which a 2-feet 6-inches gauge railway has been laid to facilitate the transport service to Zaria, and this could readily be extended so as to link up Zungeru with the main line which would probably pass west of a bend in the Kaduna River opposite Zungeru.

I regret that the time at my disposal has not been sufficient to enable me to enclose a tracing of a reference map showing the proposed line of route. The Intelligence Officer, however, at Zungeru has promised to forward me one which I will send on to Your Excellency immediately it arrives.

I have, &c.,
S. G. Brounger, M.I.C.E.

No. 9.

CROWN AGENTS to COLONIAL OFFICE.

(Received January 25, 1907.)

SIR, Whitehall Gardens, London, S.W., January 24, 1907.

I HAVE the honour to transmit, for the information of the Earl of Elgin, with reference to previous correspondence on the subject, a copy of a letter which we have received from the Consulting Engineers forwarding a memorandum which they have prepared as a supplement to their report of the 28th February, 1905, on proposed railway construction in Northern Nigeria.

I have, &c.,
E. E. BLAKE.

Enclosure in No. 9.

MESSRS. BAKER AND SHELFORD to CROWN AGENTS.

(N.N. 266.)

35A, Great George Street, Westminster, S.W., January 22, 1907.

Railway Construction in Northern Nigeria.

GENTLEMEN,

WE have the honour to enclose a memorandum upon the subject of railway construction in Northern Nigeria supplementary to our report dated February 28th, 1905, which we are forwarding at the request of the Under Secretary of State, Mr. Winston Churchill, with whom, with your concurrence, we recently had the pleasure of an interview.

We have, &c.,
BAKER AND SHELFORD.

To the Crown Agents for the Colonies,
Whitehall Gardens, S.W.

RAILWAY CONSTRUCTION IN NIGERIA.

Memorandum.

January 22, 1907.

Nearly two years having elapsed since the date of our report of February 28th, 1905, upon the Baro-Kano Railway Survey, 1903-4, and the question of railway construction in Nigeria having been actively discussed in the interval, it appears to us to be desirable to supplement our report by the present memorandum.

2. It is not, of course, within our province to propose a definite scheme of railway construction with a view to the development of Northern Nigeria, and it remains for the Government to determine whether a railway should be undertaken from Lokoja, Baro, Jebba, or some other point, and the settlement of this question must, we understand, necessarily await the report of Sir Percy Girouard, the newly-appointed High Commissioner of Northern Nigeria.

3. With regard to the question of railway construction in Northern Nigeria generally, we recently had the advantage of hearing the views of the Under Secretary of State, Mr. Winston Churchill, strongly expressed at Manchester. Mr. Churchill indicated generally that pioneer lines, preferably of 3-feet 6-inches gauge, would be sufficient for the present needs of the country, and that an expenditure of about £3,000 per mile would be justified under present conditions.

4. It is only possible to test the feasibility of this proposal by reference to some particular line of which a survey has been made. We therefore at once prepared an approximate estimate for such a pioneer line from Baro to Wushishi upon the 3-feet 6-inches gauge (and alternatively upon a 2-feet 6 inches gauge) based upon the definite information obtained by Mr. Weir's survey, taking into account that since the date of our report on the proposed Baro-Kano Railway, the cost of departmental construction has been, and is being, steadily reduced, and valuable

information has been obtained as to the life of permanent way materials in West Africa.

5. We shortly afterwards obtained from the Colonial Office the details of two estimates for a 2-feet 6-inches railway prepared (1) by Mr. Eaglesome and forwarded by the Acting High Commissioner on October 8th, 1906; and (2) by Sir Frederick Lugard, dated October 11th, 1906, based upon the definite information afforded by Mr. Weir's survey and our report.

6. We show these estimates in the following table, and have added notes explanatory of the differences in detail. The results broadly show that we are in agreement with the Colonial estimates as revised by Sir Frederick Lugard as to the cost of a 2-feet 6-inches gauge pioneer line, and that on the same basis a 3-feet 6-inches gauge pioneer line may be constructed for the sum suggested by Mr. Churchill.

STATEMENT OF COMPARATIVE ESTIMATES.

Baro-Zungeru Railway.—Length 112 miles.

—	2-feet 6-inches Gauge.			3-feet 6-inches Gauge. *Pioneer Line.*	Remarks.
	Mr. Eaglesome.	Sir F. Lugard.	Consulting Engineers, December, 1906. Approximate. *Pioneer.*	Consulting Engineers, December, 1906. Approximate.	
	£	£	£	£	
Preliminary expenses	Nil.	Nil.	Paid	Paid	This refers to expenses of survey already done.
Land	100	336	Nil.	Nil.	Consulting Engineers assume cost of land will not be charged.
Survey	—	4,480	4,480	4,480	Omitted by Mr. Eaglesome.
Clearing	Nil.	Nil.	1,120	1,120	The plans show that some clearing is necessary; if already cleared and cultivated, balance goes to land compensation.
Earthworks	30,975	33,600	32,032	34,400	Mr. Eaglesome and Sir F. Lugard propose to reduce works by increasing gradient to 1 in 50. Consulting Engineers have not considered it desirable to do this and have not allowed for it in the estimate. The result is practical agreement as to cost.
Bridges and culverts—Temporary and Permanent.	28,390	40,320	17,920	22,400	Consulting Engineers allow for temporary bridging throughout, without the use of timber, to be eventually replaced by permanent works.
Permanent way and ballast.	87,660	116,816	128,128	191,000	The defects of Mr. Eaglesome's estimate are corrected by Sir F. Lugard. Consulting Engineers' estimate includes Niger freight. Consulting Engineers allow for 2-feet 6-inches gauge for somewhat lighter rail and sleeper, found by recent experience in Sierra Leone to be suitable. For 3-feet 6-inches gauge Consulting Engineers allow for B.S. rail and suitable steel sleeper.
Carried forward	147,125	195,552	183,680	253,400	

—	2-feet 6-inches Gauge.			3-feet 6-inches Gauge. *Pioneer Line.*	Remarks.
	Mr. Eaglesome.	Sir F. Lugard.	Consulting Engineers. December, 1906, Approximate. *Pioneer.*	Consulting Engineers. December, 1906. Approximate.	
	£	£	£	£	
Brought forward	147,125	195,552	183,680	253,400	
Stations and quarters	13,200	4,480	16,000	17,000	These are of course extremely restricted in all four estimates, and according to Sir F. Lugard the provision for the staff would only consist of native huts.
Electric telegraph ...	1,210	1,800	4,480	4,480	Consulting Engineers allow for independent wire along the railway, which is desirable.
Plant and shops ...	800	5,600	5,000	5,000	Mr. Eaglesome's estimate has been corrected by Sir. F. Lugard.
Engineering and administration.	6,528	11,200	26,200	27,800	Sir F. Lugard has made a considerable addition to Mr. Eaglesome's estimate. Consulting Engineers have made proper provision for the effective supervision of the works. The estimate under this head can only be dealt with when definite proposals as to the method of construction and as to the responsibility for expenditure are available.
Rolling stock ...	15,076	16,500	25,000	25,000	
Freight (Ocean and Niger).	23,110	27,440	—	—	Consulting Engineers include in each item.
Wharf at Baro ...	Nil	560	—	—	Consulting Engineers do not provide for permanent wharf, but such a wharf as is covered by Sir F. Lugard's estimate, is included in "Plant."
Contingencies ...	Nil	26,313	—	—	Consulting Engineers have included under each head as required.
Totals	207,049	289,445	260,360	332,680	
Rates per mile...	1,849	2,584	2,324	2,971	

NOTE.—The estimate given above for a 3-feet 6-inches gauge pioneer line based on definite location plans and sections confirms the approximate estimate for a similar line laid before Sir Frederick Lugard and Mr. Eaglesome at a meeting held on August 18th, 1903, shortly prior to the departure of the survey party. Sir Frederick Lugard's report to the Secretary of State upon this proposal will be found in Blue Book [Cd. 2787], page 105.

7. The pioneer lines will, of course, differ materially from those for which we estimated in our report, dated February 28th, 1905, and we add notes of the principal points of difference.

COMPARISON of Consulting Engineers' Estimates for Pioneer Lines of 2-feet 6-inches and 3-feet 6-inches gauge, made in December, 1906, and for Completed Lines of the same Gauges made in February, 1905.

—	2-feet 6-inches Gauge.		3-feet 6-inches Gauge.		Remarks.
	Report, February, 1905.	*Pioneer Line.* Approximate, December, 1906.	Report, February, 1905.	*Pioneer Line.* Approximate, December, 1906.	
	£	£	£	£	GENERALLY.—The original estimates were for railways fit to be handed to a working department, properly ballasted and otherwise completed for working on commercial lines. The pioneer lines will be incomplete, not immune from occasional "washouts" and other interruptions, and will remain in the hands of those responsible for their construction until completed.
Preliminary expenses	3,250	Nil.	3,250	Nil.	DETAILS.—The difference is a proportion of the amount already expended on surveys and reports and has already been paid.
Land	3,000	Nil.	3,000	Nil.	In the case of the pioneer lines, it is assumed that the Government will provide all land.
Survey and staking out.	11,232	4,480	11,232	4,480	In the case of the pioneer lines, submission of the plans to Government would be dispensed with, and the location of the line would be left to the discretion of the officer responsible to Government.
Clearing	1,220	1,120	1,220	1,120	
Earthworks	68,811	32,032	68,811	34,400	Owing to the establishment of a low and somewhat arbitrary rate for labour in Southern Nigeria, and other causes, the price of earthwork may be considerably reduced. The reserve for maintenance and consolidation of earthworks has also been omitted.
Bridges and culverts—Temporary and permanent.	65,162	17,920	74,212	22,400	In the case of the original estimate for 2-feet 6-inches gauge, allowance was made for all substructures to be built for 3-feet 6-inches gauge, pending the conversion of the line. In the case of the pioneer lines, temporary bridges only are provided, but the use of timber will be avoided.
Permanent way and ballast.	154,325	128,128	211,567	191,000	The reductions are small. Increases of prices have been taken into account. The best material available locally will be used for ballast. For the 2-feet 6-inches gauge a reduction has been made in the weight of rails and sleepers, according to recent experience at Sierra Leone. For the 3-feet 6-inches gauge there is a small reduction in the sleeper.
Stations and quarters	36,236	16,000	36,236	17,000	Reduced in accordance with the requirements of a non-remunerative and administrative line.
Carried forward	343,536	199,680	409,528	270,400	

—	2-feet 6-inches Gauge.		3-feet 6-inches Gauge.		Remarks.
	Report, February, 1905.	*Pioneer Line.* Approximate. December, 1906.	Report, February, 1905.	*Pioneer Line.* Approximate, December, 1906.	
	£	£	£	£	
Brought forward	343,536	199,680	409,528	270,400	
Electric telegraph ...	8,178	4,480	8,178	4,480	Electric staff and second wire omitted.
Plant	15,000	5,000	15,000	5,000	Reduced in accordance with the character of the lines.
Engineering and administration.	62,500	26,200	62,500	27,800	It is assumed that the existing resources of the Protectorate will be freely used.
Rolling stock ...	36,000	25,000	45,000	25,000	The provision has been cut down to the extreme minimum sufficient to work the line. If remunerative traffic is developed there will be no difficulty in providing additional stock.
	465,214		540,206		
Niger freight (estimated).	20,000		30,000		Included above in estimates for pioneer lines.
Total	485,214	260,360	570,206	332,680	
Per mile ...	4,332	2,324	5,091	2,971	

Rate of Progress.

8. We may perhaps usefully summarise the dates at which the Lagos Railway could be carried to various places on the route under three different schemes for pushing the Lagos rail-head, if that policy should be adopted.

Lagos-Nigeria Railways.

Progress Schemes.

—	Railhead Reaches					
	Oshogbo.	Ilorin.	Jebba.	Zungeru.	Zaria.	Kano.
Scheme I. Uniform progress with extension of Lagos Railway at five miles per month average.	Mar., 1907.	Mar., 1908.	April, 1909.	April, 1911.	(1914)	(1915)
Scheme II. Extension from Lagos and from Jebba simultaneously—starting from Jebba September, 1907.	Mar., 1907.	Mar., 1908.	April, 1909.	Dec., 1909.	Dec., 1912.	(1914).
Scheme III. Light temporary tramway (20" gauge) built from Baro to Zungeru and work carried out from Lagos, Jebba, and Zungeru simultaneously—	Mar., 1907.	Mar., 1908.	April, 1909.	June, 1909.	Dec., 1911.	(Dec., 1913.)
Start from Jebba, northwards—September, 1907.						
Start from Baro, northwards—September, 1907.						
Complete tramway—September, 1908						
Start from Zungeru, southwards—October, 1908.						

NOTES on Mr. Eaglesome's and Sir Frederick Lugard's Estimates.

The estimates put forward by Mr. Eaglesome and Sir Frederick Lugard afford valuable information as to the class of railway or tramway, and the amount of equipment which would be satisfactory to the Government of Northern Nigeria.

There are, however, some prominent features in these estimates and reports to which we may briefly refer:—

1. Mr. Eaglesome's estimate which, in many items, is too low, has been partially corrected in this respect by Sir Frederick Lugard.
2. Rolling Stock:—

   The estimates of the cost of rolling stock are placed at £15,076 by Mr. Eaglesome, and £16,500 by Sir F. Lugard.

   Mr. Eaglesome estimates a traffic of 50 tons each way per day including Sundays, or 4,745,000 nett ton miles per annum, or, say, at least 8,000,000 gross ton miles hauled per annum.

   He allows three locomotives and therefore requires each locomotive to haul at least 2,600,000 gross ton miles per annum.

   He also allows 12 goods wagons and 12 timber trucks, or a total of 24 wagons, requiring a duty of 197,000 nett ton miles per wagon per annum.

By way of comparison it may be noted that the locomotives on the Lagos Railway last year only performed a duty of 800,000 (approximately) gross ton miles hauled per annum, and the wagons on the Lagos Railway gave a duty of 25,300 nett ton miles per annum.

The rolling stock estimate does not, therefore, provide sufficient stock to carry the estimated traffic.

3. Mr. Eaglesome's estimate of profits of the tramway is obviously unsound, as he assumes that the working expenses will be 50 per cent. of the gross receipts on an average rate of 1½d. per ton per mile.

By way of comparison the ratio of working expenses to gross receipts on the existing West African Railways have been as follows:—

Gold Coast Railway:—

1904	61·7 per cent	Average rate 13d. per ton mile.
1905	62·13 „	

Lagos Railway:—

1904	88·4 per cent	Rates 3d. to 9d. per ton mile.
1905	78·2 „	

Sierra Leone Railway:—

1903	87·17 „	Rates 3d. to 9d. per ton mile.
1904	114·6 „	
1905	91·0 „	

All these lines are better constructed, and more fully equipped than the tramway proposed by Mr. Eaglesome.

With similar rates a lower ratio of working expenses to gross receipts is obtained on a broad gauge than on a narrow one.

4. Both Sir F. Lugard and Mr. Eaglesome consider that there is no convenient point above the mouth of the Bako River which could be adopted in place of Baro as a port with a view to shortening the line of railway. Mr. Weir considered this matter worthy of investigation. If a suitable point above the Bako Mouth could be found, it would effect a very large saving in cost and mileage.

5. We should like to briefly refer to Sir F. Lugard's remark:—

   "I deplore the expenditure of £7,000 on a survey which has left no peg or mark, and must be all done over again."

Sir F. Lugard is under a misapprehension as to this, because the located line, when required, can be found at any time by an expert railway engineer from the carefully prepared tacheometric location plan made by Mr. Weir.

We ourselves are not aware of a case in which the engineers sent to stake out the line experienced any difficulty in picking up the trace from the location plans. They, of course, work from the topographical features of the country, which are

elaborately detailed on Mr. Weir's plans, which are more permanent than any pegs on the ground, which are soon destroyed or hidden.

The subject was dealt with some 10 years ago in a paper by Mr. F. Shelford which will be found in the Mins. Proc. Inst. Civil Engineers, Vol. CXXXIII., Session 1897-8, where the application of a novel system of making surveys is explained.

No. 10.

COLONIAL OFFICE to TREASURY.

[*Answered by No.* 12.]

SIR, Downing Street, February 28, 1907.

I AM directed by the Earl of Elgin to request that you will lay before the Lords Commissioners of the Treasury the following considerations and recommendations with regard to the construction of a railway in Northern Nigeria, a subject to which he has for some time past devoted much attention, and which he has examined in great detail with the assistance of officers familiar with the territory and technically qualified in matters relating to railway construction in tropical countries.

2. Their Lordships are aware that the desirability of undertaking railway construction in Northern Nigeria has been constantly pressed upon successive Secretaries of State by the High Commissioner of the Protectorate and by commercial bodies in this country, and that in 1903-4 a "location survey" of the country between the Niger and Zaria was carried out. The report on the survey (which included a location survey between Baro and Zungeru, as well as a "flying survey" between Zaria and Kano) was laid before Parliament, with other correspondence relating to railway construction in Nigeria, in a Parliamentary Paper [Cd. 2787], (December 1905).

3. The advantages to be gained by the establishment of railway communication in Northern Nigeria may be described as (1) administrative and strategic and (2) commercial.

4. The principal advantage from an administrative point of view of a railway in Northern Nigeria (assuming, of course, that its route be selected so as to connect certain important stations in the Protectorate) would be to provide a cheap and trustworthy means of transport, replacing the existing system of human carriage and pack-animals. The animal transport service instituted by Sir F. Lugard is carried on at great expense, and in the face of immense difficulties. Oxen are not easily obtainable, much time has to be spent on their training, and they are constantly subject to diseases produced by the attacks of blood-sucking flies, for which no effective remedies have yet been discovered. Their rate of progress is also very slow, and in any emergency it is necessary to resort to the primitive system of carriers. These are increasingly difficult to get, for, with the cessation of slave-raids and the security afforded by the Administration, the adult population is devoting itself to agriculture and trade. It is unnecessary to point out that the compulsory enlistment of carriers is repugnant to the principles of British rule, besides creating a feeling of resentment against the Government and retarding the progress of the country.

5. The acceleration of transport is also specially desirable from a military point of view. So great an extent of country cannot be conveniently held for an indefinite period by a considerable force of drilled troops in garrison unless buckled together by at least one central line of rapid communication. At present it may take three weeks to engage carriers and to move a body of troops from Lokoja to Zungeru; but, if the latter place were connected with a point on the constantly navigable Niger such as Baro (between Lokoja and the mouth of the Kaduna) the journey by rail and steamer could be accomplished in 18 hours. The facilities for reinforcement thus created would, in Sir F. Lugard's opinion, be equivalent to an addition of 300 men to the Protectorate force. It would therefore seem reasonable to suppose that, if such a railway were constructed, a reduction in the number of the force might safely be made.

6. The establishment of a combined railway and steamboat service to Zungeru would save much time wasted by officers in proceeding to and returning from their posts, during which time full pay and allowances are drawn. It would also obviate

the necessity for the canoe journey down the Kaduna (very dangerous to invalids) and for the duplication of posts at Zungeru and Lokoja, which under existing circumstances cannot be avoided.

7. Considerable economies in civil and military expenditure, together with greater security and efficiency, can therefore be confidently anticipated, resulting, first, from increased mobility and accessibility enabling fewer men (whether soldiers or civilians) to do more work; secondly, from the reduced expense of maintaining and supplying troops in garrison or in the field; and, thirdly, from the improvement in the conditions of service of Europeans (food and housing) and consequently in their health. These reasons may be regarded as sufficient in themselves to justify a considerable amount of not directly remunerative expenditure on railway construction, but additional to them is the prospect of the speedier development of local trade, upon which ultimately the capacity of the country to yield revenue depends.

8. The construction of a railway, besides tending actually to increase the volume of production and trade, would have the effect of attracting in the direction of the Niger and the sea the large existing trade of the inland Hausa States. The French, on the borders of Northern Nigeria, are eager competitors for this trade, seeking to maintain it in its present channel, through territory controlled by them, across the Sahara to the Mediterranean, or divert it round to the confines of Northern Nigeria so as to bring it to the Niger at the point where their own railway through Dahomey will eventually reach that river.

9. But even more important from a commercial point of view is the prospect which the construction of a railway opens up of a great development in the cultivation and export of cotton. The Chambers of Commerce in this country and the British Cotton Growing Association strongly advocate railway construction. The latter see in Northern Nigeria the most fruitful field for their labours, and a railway would enable them to open up areas of production which otherwise the lack of transport would compel them to leave untouched.

10. I enclose a report* of the proceedings at the reception, in May last, by the Prime Minister, of a deputation organised by the British Cotton Growing Association to urge the necessity of improved transport facilities in Northern Nigeria. The importance of this deputation will be seen from the list of its members, representatives of the industry and commerce of the United Kingdom, which is printed on pages 4 to 13 of the report, and I am to call special attention to those passages of the preliminary memorandum (pages 20 and 21) which describe the advantages of Northern Nigeria as a cotton-growing country. Chief among these is the fact that there is no question of introducing the cultivation of cotton into the Protectorate, as it has been grown there from time immemorial. It may be added that since the date of the deputation, the Association have established ginneries in Northern Nigeria and that a certain amount of cotton of good quality has been exported. The high cost of the only existing means of transport (carriage on men's heads) is, however, as pointed out on page 23 of the report, prohibitive of the export of any cotton which is not grown near the river.

11. The Secretary of State is of opinion that the importance of establishing railway communication in Northern Nigeria has been fully established, and that, if this be admitted, it is a necessary conclusion that construction should be undertaken as soon as practicable, in order that the consequent economies and other benefits, administrative and commercial, may not be delayed. It should also be noted that, unlike many railways or large engineering operations, these benefits will not be deferred until the completion of the line. Every mile that is constructed will save in carriage of indispensable supplies and will increase military mobility. The advantages, therefore, which are to be gained will be reaped evenly over the whole mileage as, and in proportion as, the line is constructed.

12. The question of the route which the railway will follow necessitates a brief statement of the present position as regards railway construction in Nigeria generally. The enclosed map† shows the situation of the places which are referred to.

13. The existing railway in Southern Nigeria runs from Lagos in a northerly and north-easterly direction, and will soon be completed as far as Oshogbo (about 190 miles). This railway is of the standard West African type, and has cost, completely equipped, about £7,000 a mile. An extension to Ilorin has been sanctioned, and a further extension to Jebba, on the Niger, has been agreed to in principle,

* Not reprinted. † Not reproduced.

with the view of the eventual prolongation of the line across the Niger to Zungeru, Zaria, and Kano. It is, however, understood that before the railway is extended beyond Illorin (which it is expected to reach in 1908) the situation will be reviewed, and the question of the extension to Jebba, (including the bridging of the Niger) will receive further consideration. As will be seen from the report of the deputation already referred to, and from Lord Elgin's speech in the House of Lords on the 10th of May 1906 (printed at page 61 of the pamphlet) the report of the Surveyor (Mr. Weir) and the recommendations and estimates of the Consulting Engineers had been considered at that date, but that the Secretary of State was awaiting the return of Sir F. Lugard to England before coming to a conclusion as to the course to be followed. It had not then been established to his Lordship's satisfaction that it might not be preferable to postpone railway construction in Northern Nigeria until the Protectorate was reached by the gradual extension northwards of the Lagos Railway, especially in view of the discrepancy between Sir F. Lugard's estimate of the cost of a tramway of 2-feet 6-inches gauge which at that time he put at only £2,000 a mile, and the estimate of the Consulting Engineers, which amounted to about £4,300 a mile for a 2-feet 6-inches line and to about £5,000 a mile for a light line of the African standard gauge (3 feet 6 inches) which was recommended for adoption in preference to the 2-feet 6-inches line.

14. On the return of Sir F. Lugard to England the whole subject was discussed by Lord Elgin with him, and also with Sir Walter Egerton, the Governor of Southern Nigeria, who was summoned to this country for the purpose. The outcome of these discussions was, that his Lordship recognized that there was good ground for the opinion that railway construction should be undertaken in Northern Nigeria independently of the extension of the railway from the south, but that he considered (1) that such construction should, in the first instance at any rate, be confined to a line between Baro and Zungeru, which would meet the immediate requirements of the Protectorate, and (2) that the discrepancy between the estimates of cost should be cleared up.

15. As regards the extension northwards of the Lagos Railway, it will be seen from the foregoing observations that it cannot at present be stated when the railway will cross the Niger at Jebba; and I am to explain that Jebba, although the most suitable place for a bridge, is not a centre of trade. It appears to be established that Northern Nigeria would derive very little benefit from a railway at Jebba, or indeed until railhead had reached Zungeru and the important trade route that passes that town; for the country between Illorin and Jebba is for the most part barren, and between Jebba and Zungeru there is a scanty population and but little cultivated land. His Lordship is, therefore, convinced that it would be unwise to leave the territories beyond the Niger for so long a period as must elapse before a through railway to the coast can be opened, without the assistance which a form of rail transport must necessarily give to their development.

16. Sir Frederick Lugard, after reconsideration of all available data and taking further advice, submitted in October an amended estimate of £2,584 a mile for a line of 2-feet 6-inches gauge from Baro to Zungeru, and the Consulting Engineers have expressed their agreement with this estimate and have also submitted a detailed statement showing that a "pioneer" line of the kind proposed by Sir F. Lugard could be constructed on a gauge of 3 feet 6 inches for £2,971 (say £3,000) a mile. The total distance, inclusive of allowance for sidings, may be taken to be 125 miles, so that the cost of the railway would be £375,000. This reduction from their original estimate was arrived at by the elimination of certain heads of expenditure (such as the provision of wharfage at Baro) and by the reduction of other heads to the minimum requisite for a "pioneer" line. The substitution of a gauge of 3 feet 6 inches for one of 2 feet 6 inches does not seriously increase the cost, and is obviously desirable in order to avoid any difference of gauge between the lines in Northern Nigeria when the trunk line from the south eventually reaches the Protectorate. If that line is extended to Jebba and thence to Zaria and Kano viâ Zungeru, the Zungeru-Baro line will be a branch line connecting Zungeru with the Niger at a point accessible to river steamers throughout the year except during the two months when the water is lowest, while at the period of the highest river (August and September) ocean-going vessels drawing 12 feet can ascend the Niger to Baro.

17. Sir Percy Girouard, who has been appointed High Commissioner of Northern Nigeria, and who has had exceptional experience in the rapid and economical construction of pioneer railways in tropical countries, has devoted much attention

to this matter, and Lord Elgin has had the benefit of his advice before coming to a decision on the subject. I enclose herewith a memorandum by Sir Percy Girouard, briefly summarising his views, in which the Secretary of State concurs.

18. The proposal which his Lordship now desires to submit for the favourable consideration of the Lords Commissioners of the Treasury is that a sum of £375,000 should be provided for the construction of a pioneer line of 3-feet 6-inches gauge from Baro to Zungeru. Lord Elgin would further make it an essential part of the proposal that no extension of this line beyond Zungeru in the direction of Zaria shall be undertaken until the Lagos Railway has reached Illorin, when the general railway policy of Nigeria will be reviewed as stated in the 13th paragraph of this letter.

19. In conclusion I am to observe that if their Lordships concur in Lord Elgin's opinion that this undertaking is one which justifies the provision from public funds of the amount in question, there are strong reasons for authorizing at the earliest possible date the necessary purchase of permanent way material, &c., with a view to its delivery at Baro in August or September next. As has already been stated, it is during those months alone that large vessels can reach Baro, and great economy will be effected by utilizing such vessels. In fact, it may be said that, unless the materials are delivered in August or September of the present year, it will be necessary to defer their delivery, and the commencement of construction, until the corresponding months in 1908. A second, and very important, reason for beginning the work this year is that the services of Sir Percy Girouard as at present arranged will not be available in Northern Nigeria after April 1908. If the work is begun during his tenure of the appointment of High Commissioner, it will have the advantage of his personal supervision. Should, however, construction be postponed until he has left the Protectorate, there can be little doubt that its progress would be attended with more difficulty, and that the work would be carried out less cheaply and less expeditiously.

I am, &c.,
R. L. ANTROBUS.

Enclosure in No. 10.

MEMORANDUM on Northern Nigeria Railways by Lieutenant-Colonel Sir Percy GIROUARD, R.E., K.C.M.G., D.S.O., February 20, 1907.

On appointment as High Commissioner instructions were conveyed to me that one of many matters which should engage my attention would be the examination of a project for a light railway from Baro on the Niger, put forward by Sir F. Lugard, and more particularly that my opinion was desired as to the method of construction and cost of such a line.

2. Since my appointment I have had opportunities of meeting and discussing details of railways with the Officers of the West African Department of the Colonial Office, and with Sir Frederick Lugard, Mr. Eaglesome (Director of Public Works in Northern Nigeria), Sir Ernest Blake, and Mr. Shelford (one of the Consulting Engineers for the West African Railways). I have also had time to closely examine the detailed surveys carried out in 1904 under Mr. Shelford's direction, more particularly those of the proposed line from Baro to the capital (Zungeru) a distance of about 125 miles.

3. At the time of my appointment I found that there was some conflict of opinion between the Consulting Engineers and Sir F. Lugard as to the probable cost of a line between the points mentioned (Baro-Zungeru). Sir F. Lugard with his Public Works Officers had arrived at the conclusion that a 2-feet 6-inches gauge tramway could be constructed at a cost of £2,584 a mile, while the Consulting Engineers had placed the cost of a railway at about £4,300 for a 2-feet 6-inches, and at about £5,000 for a light 3-feet 6-inches, gauge.

4. Sir F. Lugard's chosen standards were, in comparison with those of the Consulting Engineers, very light, but in his opinion suited to the traffic anticipated. In so far as the Baro-Zungeru line was concerned, my conclusion, with the information available, was that Sir F. Lugard's estimate was a possible one. Deprecating a change of gauge in West Africa, my final conclusion was that there was everything

to urge in favour of a light 3-feet 6-inches gauge, which I put at £2,700 a mile, provided always that all local resources and staff of the Protectorate would be utilised as far as possible.

5. Owing to the difference of opinion, I understood that one of the various points I should consider on arrival would have to be the feasibility of the lower estimates. Consequently, I was on the point of requesting that some technical assistants versed in survey work and unconnected with the local Public Works Department should be despatched to Nigeria, when, on the 30th January, I was shown a letter from the Consulting Engineers which appeared to give all information necessary for a decision without any further expenditure of money on surveys.

6. In this letter, which is dated 22nd January, the Consulting Engineers forward some further estimates of the cost of the Baro-Zungeru line. In these estimates, which are based upon the detailed surveys of 1904-05, figures of £2,234 per mile for a pioneer 2-feet 6-inches gauge line and of £2,971 for a 3-feet 6-inches of the same type are arrived at. It would therefore appear that all our expert opinion is now agreed as to the practicability of building a light 2-feet 6-inches pioneer line between Baro on the Niger and Zungeru at figures very similar to Sir F. Lugard's.

7. As the Consulting Engineers' estimates are based upon highly detailed surveys, there would appear no necessity for further technical examination of the ground or report upon the Baro-Zungeru line. There is now, I earnestly believe, ample evidence to warrant consideration of the construction of the Baro-Zungeru line. My own view is, however, for the adoption of the West African standard gauge of 3 feet 6 inches constructed on the Consulting Engineers' estimates at £2,971 (say £3,000) per mile, and in this choice of gauge I believe I have the full support of Messrs. Baker and Shelford.

8. Since the receipt of Mr. Shelford's last estimates I have gone fully into the standards he proposes for this light pioneer line, and find myself in agreement with them. Mr. Eaglesome, Director of Public Works, who was, I understand, largely responsible for Sir F. Lugard's proposals, was present at these meetings.

9. The character of the proposed line is best described in the Consulting Engineers' words in the report of 1905:—

> "This section of the line is very easy, and a surface line was obtained for 62 per cent. of the distance. About 40 miles from Baro the line crosses a range of hills 250 feet high, but the line is so located that no heavy cutting is required, the only works of any size being six banks across small ravines. . . . . The ruling gradient on the section is 1 in 75, but some short lengths of 1 in 60 occur between 91½ and 99½ miles from Baro. Mr. Weir has supplied a sketch map of an alternative line on which a gradient of 1 in 75 can be obtained, as on the rest of the section, without increasing the cost. The sharpest curves used on the section have a radius of five chains."

10. From the above description it will be seen that the proposed alignment is of a high standard, and capable of any improvement without any abandonment of original capital expenditure.

11. To provide for low initial cost, the Consulting Engineers have reduced to a minimum stations, buildings, turntables, shops, telegraphs, &c., but have given a good workable pioneer line provided with a 45 lb. rail and efficient hauling powers, capable of dealing with 20,000 to 30,000 tons a year each way, which would appear ample for the original development of the country. As traffic increased, additional rolling stock and facilities would become necessary, by the provision of which the line would be made capable of meeting an expansion in traffic up to some 200,000 tons per annum.

12. Summarising my opinions, I am in favour of:—

(1) A 3-feet 6-inches pioneer line;

(2) Construction by local staff;

(3) Adoption of Consulting Engineers' estimate of, say, £3,000 per mile, or a total cost of £375,000.

E.P.C.G.

February 20, 1907.

No. 11.

CROWN AGENTS to COLONIAL OFFICE.

(Received March 13, 1907.)

Whitehall Gardens, London, S.W.. March 12, 1907.

Northern Nigeria Railway.

SIR,

WITH reference to our letter of the 24th January,* I have the honour to enclose, for the information of the Secretary of State, a copy of a letter which we have received from the Consulting Engineers transmitting a revised estimate for the suggested pioneer line from Baro to Zungeru.

I have, &c.,
M. A. CAMERON.

Enclosure in No. 11.

(N. N. 267.)

35a, Great George Street, Westminster, S.W., March 1, 1907.

Northern Nigeria.

Pioneer Railway—Baro to Zungeru.

GENTLEMEN,

IN continuation of our letter, N. N., 266, of the 22nd ultimo, we have the honour to report that we have had during the last few weeks numerous interviews with Sir Percy Girouard, and latterly with Mr. Eaglesome also, and have now revised and amplified, for the information of yourselves and the Colonial Government, our estimate for the light pioneer railway from Baro to Zungeru on a 3-feet 6-inches gauge which we have put forward.

2. We have explained our proposals fully to Sir Percy Girouard, and understand that he and Mr. Eaglesome concur in them.

3. We now forward, for your information, three copies of our estimate in further detail, showing clearly, at Sir Percy Girouard's request, the estimated expenditure in England, and the amount available for local expenditure. The latter shown in the fourth column of the accompanying estimate, and based upon information contained in Mr. Eaglesome's previous estimates, has been discussed in detail with Mr. Eaglesome, and he has agreed that the work in the Colony can be done for the sums given, although the allocation of the total sum between the sub-heads of estimate may be modified when the line is definitely staked out.

4. With regard to the expenditure in Great Britain, we have, after carefully considering Sir Percy Girouard's views as to the probable future of the line, provided for a 45-lb. rail and 1,760 sleepers per mile in place of a 40-lb. rail and 1,936 sleepers per mile. We have also revised the prices in our estimates in accordance with the present market conditions.

5. We have already handed you particulars to enable you to obtain tenders for the rails, sleepers, and fishplates, and will, in due course, forward particulars of the remaining permanent way materials, locomotives and rolling stock, bridge and other material for early shipment, which we will draw up in conference with Mr. Eaglesome.

6. The estimate is shown for a length of 112 miles, which is the surveyed length from Baro to Wushishi, for which only we have the necessary information, and we have added to this amount a provision for the alteration of the existing 12 miles of 2-feet 6-inches gauge to Zungeru.

7. The net result of the estimate is that, provided satisfactory deliveries and freight to Baro are obtained, and the work in the Protectorate is carried out for the amount available, such a pioneer line as we have indicated will be constructed for the sum of £3,000 per mile.

We have, &c.,
BAKER AND SHELFORD.

To the Crown Agents for the Colonies,
Whitehall Gardens, S.W.

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* No. 9.

NORTHERN NIGERIA RAILWAYS.—BARO-WUSHISHI SECTION Proposed Pioneer Line.

Estimate, 28th February, 1907. 3-ft. 6-in. gauge. Estimated length, 112 miles to Wushishi (with relaid lines to Zungeru 124 miles).

Note.—Baro-Wushishi section joins existing 2-ft. 6-in. gauge line 12½ miles from Zungeru.

—	Estimated Expenditure in Great Britain.			Amonnt available for Local Expenditure.	Total.	Notes.
	Stores.	Freight and Charges.	Total.			
	£	£	£	£	£	
Preliminary expenses	—	—	—	—	paid	
Survey	344	43	387	4,093	4,480	The expenditure in England is for further Instruments, supplies of paper, &c., for plans and photo-printing outfits and materials.
Compensation	—	—	—	—	nil	
Clearing and Earthworks ...	—	—	—	35,520	35,520	Details annexed.
Bridges and culverts, steel joists, trestles and/or piles bolts, timber, sleepers, dogs and fastenings, cement, &c.	—	—	12,919	15,281	28,200	Details annexed. Expenditure in England is dependent, as relates to quantity of material to be supplied, upon indents from Colony for material and/or detail plans showing the waterway required and character of bed, &c., to be prepared at the time when the line is staked out. Standard bridge and trestle plans would be furnished by the Consulting Engineers for drawing these indents.
Permanent way and ballast, as per details.	118,925	20,968	142,562	61,384	203,946	Provides for purchase of materials on present unfavourable market and for 45-lb. B.S. steel rails and steel sleepers 72 lbs. each and 1,760 per mile. The excess £12,946 over estimate of December, 1906, is principally due to the present high prices of material. The amount under freight is to Burutu only. River freight is included in the local expenditure.
Stations and quarters	—	—	3,215	9,985	13,200	This amount is based on the assumption that the line will be carried forward on 3-ft. 6-in. gauge to Zungeru, where suitable machine shops are said to be available. The local administration will restrict the expenditure to the amount available.
Electric Telegraph	—	—	—	2,000	2,000	
Plant	3,400	600	4,000	1,000	5,000	Details annexed.
		163,083		129,263	292,346	

	£	£	£	£	£	
Rolling Stock	—	28,280	—	—	28,280	Details annexed.
Engineering and administration	—	4,000	—	23,000	27,000	
Total—Baro-Wushishi (new line).				£347,626		
Relaying, &c., to Wushishi-Zungeru Section :—						
Earthworks	—	—	—	1,200	—	Freight and charges have been estimated (as shown on the Sheet details of Permanent Way) at 55*s.* per ton to Baro based upon the current rates from Liverpool to Burutu and an average of the Government estimate of the freight for Burutu and Baro. This is in excess of the rate which may be expected under proper arrangements for through transport to Baro of a large quantity of materials. The estimate is subject to a deduction of £7,625 for every 10*s.* by which the total freight and charges are less than 55*s.* per ton.
Bridges and culverts ...	—	—	—	2,000	—	
Permanent way	—	—	—	20,474	—	
Administration and engineering.	—	—	—	700	—	
				£372,000	= £3,000 per mile.	

SURVEY.

Instruments, &c., to be supplied from England.

The following provision has been made, assuming the Protectorate have already a fair supply, 3 sets each of the following :—

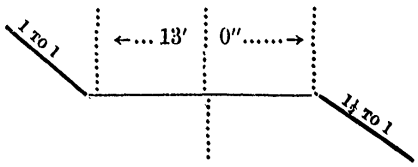
	£ s. d.	£ s. d.
1 theodolite	30 0 0	
1 level	14 0 0	
1 cross staff head, with pole	8 6	
2 16-ft. levelling staves	5 5 0	
6 8-ft. ranging rods, red and white	17 6	
6 6-ft. Do Do.	13 6	
2 100-ft. steel bands	3 0 0	
1 100-ft. steel chain	1 0 0	
20 steel arrows with red tags	3 6	
2 plummets	5 0	
2 instrument umbrellas	1 14 0	
2 100-ft. Chesterman's tapes	16 0	
Minor instruments, prismatic compass, inclinometer, hand level, protractor, drawing instruments	16 13 0	
3 sets at	£74 16 0	224 8 0
2 printing frames		8 0 0
2 zinc baths		1 10 0
Ferro paper, &c.		10 0 0
Drawing paper, tracing paper and cloth, sectional paper, profile paper, copies of plans, 2 dozen level books and sundries		100 0 0
		£343 18 0
Packing and freight and charges, say 12½ per cent.		43 2 0
		£387 0 0

The above only to be supplied as and to the extent indented by Director of Public Works.

EARTHWORKS.

c. yds.		£
566,353	Gross measurement, banks and cuttings, at 9*d.* Price as given by Mr. Eaglesome in his estimate of October, 1906, as "including cost of importing labour, supervision, &c."	21,238
miles.		
70	Surface forming at £180	12,600
	Cuttings at 13 ft. 0 in. formation and 1 to 1 slopes as average for part 12 ft. 0 in. wide and vertical and part 14 ft. 0 in. wide with slopes as required.	
	Stores and sundries, allow	562
	Tools from England provided under "Plant"	—
	Clearing	1,120
		£35,52

Estimated Dimensions of Earthwork.



BRIDGES AND CULVERTS.

	£
2391 lineal ft. waterways (Mr. Weir's estimate), to be provided by steel pile trestle or steel trestle bents on concrete sills or wells according to nature of bottom, per foot, £6	14,346
190 pipes and culverts (Mr. Weir's estimate) corrugated iron pipes to be used, average £20	3,800
Sundries, protection of banks, &c., 20 per cent. on above	3,629
Unappropriated (covers excess of Bako Bridge over running quantity of waterways as above)	6,425
	£28,200

Division between Expenditure in England and in Protectorate :—

—	England.		Protectorate.	
	per cent.	£	per cent.	£
Trestle, &c.	50	7,173	50	7,173
Pipes	67	2,534	33	1,266
Sundries	—	—	—	3,629
Unappropriated	50	3,212	50	3,213
		£12,919		£15,281

Permanent Way Estimate Details.

45-lb. Rail. 72 lb. Sleeper. 10 to 10 yards.	Estimated Expenditure in England. Stores.	Freight and Charges.	Total.	Amount available for Local Expenditure.	Total Estimate.	Notes.
Tons.	£	£	£	£	£	
8,202·36 rails (116 miles by 70·71 tons per mile) at £7 15*s.*	63,568					Length Main Line— Miles. 112 Points and Crossings.
330·60 fishplates, 17 lb. per pair (375 pairs per mile, allowing for short rails and waste) = 2·85 tons per mile, at £9 5*s.*	3,058					Sidings, Bida ... 3,100 ft. 6 Sleepers, 116 miles = 206,200
51·04 fishbolts at 0·636 lb. each (1,550 per mile) = ·44 tons per mile at £18.	919					Intermediate stations ... 10,000 9 Deduct for timber sleepers on bridges 700
6,583·18 204,810 sleepers and keys (10 per rail, 1 per cent. waste) 116 miles = 206,200 sleepers at £7 15*s*, per ton.	51,020	20,968	139,893	20,968	161,251	Terminal stations 8,032 15 Deduct for crossing sleepers 690
15,167·18 tons.						21,132 = 4 30 Net 204,810
						Total 116 miles.
30 sets points and crossings and crossing sleepers.	360			390		Freight and charges payable in England, estimated on 15,250 tons— per ton. s. d.
Total tonnage, 15,250 tons.						Inspection 1 0
Landing, stacking, tallying, &c., charge—						Freight and shipping charges 24 9
15,250 tons at 5*s.* per ton	—	—	—	3,812	3,812	Insurance ... ... — Omitted according to Southern Nigeria practice.
Transport, 15,250 tons by 112·2 miles at 3*d.*	—	—	2,669	8,006	10,675	Crown Agents ... 1 9
Laying (10¼*d.* per yard)	—	—	—	8,720	8,720	27 6 = £20,968.
Ballasting, 1,200 cubic yards per mile at 2*s.* 6*d.*	—	—	—	17,400	17,400	Freight and charges locally. s. d. Agency, &c., at Burutu ... 2 6 Niger freight 25 0
Maintenance, £18 per mile	—	—	—	2,088	2,088	27 6
	£118,925	£20,968	£142,562	£61,384	£203,946	Total 55*s.* This charge covers the erection, maintenance, and working of the locomotives and rolling stock engaged in transport of permanent way material. The expenditure in England is for coal, oil, and stores. Assuming only the best material locally available to be used. Upkeep of track between base and rail head during construction.

			£	£	£	£	£
34287	Total quantities, including 12 miles extra for Wushishi-Zungern relaying :—						
8,202·36 848	9,050 tons rails	... additional cost.	5,936	—	—	—	—
330·60 34·30	356 tons fishplates	„	326	—	—	—	—
	56½ tons fishbolts	„	99	—	—	—	—
6,583 680	7,263 tons sleepers and keys.	„	5,270	—	—	—	—
	16,734½ tons.		£11,631	£2,200	£13,831	£6,640(a)	£20,471

(a) Landing 1,600 tons additional, on arrangements already paid for, 3*s.* 240
Transport, 1,600 tons 118 miles... 2,400
Laying, 12 miles at £75 900
Ballast, 12 miles at 600 cubic yards at 2*s.* 6*d.* 900
Maintenance ... . nil
£6,640

say, 16,850 tons with switches, crossings, packing, &c., for freight.

STATIONS EXPENDITURE IN ENGLAND ON STATION MACHINERY AND FITTINGS.

	£	s.	d.	£	s.	d.
Machine tools, &c., for workshops	1,000	0	0			
2 Turntables	800	0	0			
2 Tanks and pumps, £260	520	0	0			
1 Do. £220	220	0	0			
1 Do. £160	160	0	0			
4 Platform weighing machines, 5 cwt.	36	0	0			
Safes and travelling cash chest	74	0	0			
6 Copying presses without stands	20	0	0			
6 Leather despatch bags	5	0	0			
6 Ticket daters	16	0	0			
6 Station bells	5	0	0			
6 Tin wells and damping brushes	1	0	0			
6 Office clocks	15	0	0			
12 Fire buckets	1	10	0			
6 Cash bags	3	15	0			
6 Parcel spring balances	4	10	0			
3 2-cwt. spring weighing machines	11	0	0			
1 Set measures	1	15	0			
2 Oil tanks (200 gallons)...	13	0	0			
1 Do. (100 gallons)...	5	0	0			
Freight and sundries	302	10	0			
				£3,215	0	0

The above only to be supplied as arranged between Consulting Engineers and Director of Public Works.

PLANT.

	£	s.	d.	£	s.	d.
1 Locomotive, Class 1, f.o.b., £1,100	1,100	0	0			
Tools for earthworks, allow £10 per mile, 112 miles	1,120	0	0			
6 Forges, anvils, portable vice, and set of smith's tools	100	0	0			
Platelayers' tools, allow	150	0	0			
Rope	50	0	0			
Pile driver, &c.	80	0	0			
Bridge-erecting tools, allow	100	0	0			
				2,700	0	0
Unappropriated				700	0	0
				3,400	0	0
Freight and charges				600	0	0
Landing stage at Baro (local)				1,000	0	0
				£5,000	0	0

The above to be supplied as arranged between Consulting Engineers and Director of Public Works.

ROLLING STOCK. Cost, including freight and charges.

	£	s.	d.	£	s.	d.
2 6-coupled Class II locomotives	5,000	0	0			
2 8-coupled Class III locomotives (if procurable, otherwise number must be reduced)	6,000	0	0			
Spares	1,000	0	0			
Strictest economy to be sought by use of steel firebox and tubes, cast-iron wheel centres, &c.						
50 waggons, open goods, £200 each, or 40 waggons, open goods, £250 each	10,000	0	0			
These alternatives represent the possibilities of favourable or unfavourable terms for the waggons. The class of waggon to be 32-ft. low-sided open bogie waggons on timber underframes and Fox trucks, with W.A.G.R. buffing gear and chilled iron wheels, unless either diamond bogies in place of Fox trucks, or pressed steel in place of timber underframes, permit of the supply on more favourable terms.						
2 Composite carriages (1st and 2nd), 2 2nd class, 3 brake vans, average, £600	4,200	0	0			
1 10-ton hand crane	700	0	0			
Trolleys and spares	1,380	0	0			
				£28,280	0	0

No. 12.

TREASURY to COLONIAL OFFICE.

(Received April 1, 1907.)

[*Answered by No.* 13.]

SIR, Treasury Chambers, March 30, 1907.

THE Lords Commissioners of His Majesty's Treasury have given their careful consideration to Mr. Antrobus's letter of the 28th ultimo,* in which the Earl of Elgin requests their sanction for an expenditure of £375,000 on the construction and equipment in the Northern Nigeria Protectorate of a railway 125 miles in length from Baro on the River Niger to Zungeru on the River Kaduna, at an estimated cost of £3,000 per mile. I am to request that you will submit to the Earl of Elgin the following reply:—

In the first place my Lords cannot but notice the wide discrepancies between the various estimates which have been submitted in connection with this project. Thus, the cost of connecting Baro and Zungeru by a tramway of 2-feet 6-inches gauge has been estimated by Sir F. Lugard first at £2,000 per mile, and finally at £2,584 per mile; while for a line of the standard African gauge (that now proposed, viz., 3-feet 6-inches), the original estimate of the Consulting Engineers was about £5,000 per mile.

The latter estimate has been reduced by the Consulting Engineers, with the concurrence of Sir P. Girouard, to £3,000 per mile—a figure which will admittedly only suffice for a "pioneer" line—and this their Lordships are now asked to accept.

But they are given no information as to the calculations on which this revised estimate is based, except the statement that the reduction is due to the "elimination of certain heads of expenditure (such as the provision of wharfage at Baro), and the reduction of other heads to the minimum requisite for a pioneer line."

The original calculations were worked out with great care; and even they fell far short of the cost of the Lagos line (of the same gauge but of a rather heavier type) which amounted to about £7,000 a mile.

Moreover, in view of the statements on page 162 of the Blue Book ([Cd. 2787], 1905), it is not easy to see how the wharfage at Baro is to be dispensed with, when the railway begins to carry merchandise for shipment.

In these circumstances my Lords hesitate to accept and act upon an estimate which shows so large a reduction, without first submitting it to a far more careful examination than is possible on the information before them.

Nor are these the only grounds of objection.

It is admitted that the "pioneer" line of 125 miles from Baro to Zungeru is intended as the first link in a system which is to be in time extended to Zaria and Kano, a further distance of about 270 miles.

Their Lordships could not, therefore, sanction the first stage of construction without finding themselves committed in advance to the approval of the scheme as a whole, which, assuming the estimated cost of construction (£3,000 per mile) not to be exceeded in any part of the line, involves a minimum capital outlay approaching £1,200,000.

But previous experience and the obvious necessities of the case combine to show that the probable outlay will be far greater than this. The "pioneer" line itself will need to be reconstructed on a more generous scale, and the extensions will, probably from the first, be in keeping. In these circumstances my Lords cannot doubt that the ultimate capital expenditure will not be far short of, even if it does not exceed, £2,000,000; and, in the present state of the national finances, they cannot commit themselves—at any rate on the materials now before them—to such a scheme.

In the next place, the proposal of the Secretary of State is presented at such a time that, unless it receives immediate sanction from their Lordships with hardly a day's further consideration, and unless immediate irretrievable steps are taken towards its execution, it must be laid aside for the present year.

In other words, my Lords are asked to authorise the placing of contracts for rails and sleepers, and the entering into charter-parties for steamers, before any Parliamentary sanction for the project has been obtained or even sought. This,

* No. 10.

in their opinion, is a step which could not possibly be defended by His Majesty's Government in the House of Commons, except on the ground of some grave and unforeseeable urgency, of which there is no evidence in the present case.

But even if this Board were prepared, in the circumstances represented above, to give their immediate assent, it appears to them to be exceedingly doubtful whether it would be possible to begin the work next autumn as is proposed.

The indispensable condition of any such beginning is that the whole material for a year's construction should be delivered on the Niger at Baro in the course of the seven or eight weeks in August and September during which alone heavy cargoes can be landed there by direct shipments. To secure such delivery the contracts must be placed forthwith and steamers chartered of suitable draught. In these circumstances, any delay on the part of the contractors or any accident or hitch in the arrangements would mean that part or all of the materials for construction would fail to reach their destination in time, and remain unusable during the period of low water for the ensuing 10 months. Moreover, their Lordships gather that the arrangements for discharging cargo at Baro are primitive, and for this work quite unknown.

Again, as my Lords understand, there are serious questions still to be decided as to the navigability of the Niger at and below Baro and its depth and carrying capacity at different seasons of the year—questions on which depend not only the feasibility of beginning operations within the short time now available, but also—a matter of still greater importance and one in which any mistake would be almost irretrievable—namely, the suitability of Baro as a terminus.

For these reasons their Lordships regret to be unable to approve, either in principle or in detail, the proposal before them; and they must urge the Secretary of State, before any scheme is finally adopted, to take advantage of Sir P. Girouard's impending arrival in Nigeria by instructing him to make a detailed and exhaustive report at first hand on the transit and traffic possibilities of his new province.

The High Commissioner should be able to furnish a report, perhaps to formulate a scheme, in the autumn, and there would then be ample time (which there is not at present) for its careful examination and consideration by this Board and to obtain previous Parliamentary sanction.

I am, &c.,
G. H. MURRAY.

No. 13.

COLONIAL OFFICE to TREASURY.

[*Answered by No.* 15.]

SIR, Downing Street, May 16, 1907.

I AM directed by the Earl of Elgin to acknowledge the receipt of your letter of the 30th of March,* giving reasons why the Lords Commissioners of the Treasury are not at present prepared to give their assent to the proposal, contained in the letter from this Department of the 28th of February,† that a sum of £375,000 should be provided from public funds for the construction of a pioneer line of railway from Baro to Zungeru in Northern Nigeria.

2. Lord Elgin does not desire at this stage to enter into any detailed controversy on the subject of the proposed railway, but he considers that it may be useful to make the following observations on some of the points to which attention is directed in the Treasury letter of the 30th of March.*

3. Sir Frederick Lugard's estimate of £2,000 a mile for a 2-feet 6-inches tramway was based upon the actual cost of the existing tramway between Barijuko and Zungeru. His reasons for believing that such a tramway or "railed road" could be constructed at this cost are given in the "Notes on Estimate for Tramway," dated the 11th of October, 1906, which also shows his reasons for increasing the estimate to £2,583 per mile.

4. The original estimates of the Consulting Engineers, viz., £4,332 per mile for a 2-feet 6-inches line, and £5,091 for a 3-feet 6-inches line, were for railways ready for working on a commercial basis, and prepared and equipped to deal with all traffic which might be anticipated. The "pioneer line" of the same gauge, which

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* No. 12. † No. 10.

the Consulting Engineers estimated to cost £2,971 a mile, would be a line sufficient to meet immediate requirements, but which would eventually, as stated in your letter, need to be "reconstructed on a more generous scale." I am, however, to point out that such reconstruction would not be required until the traffic had increased to such an extent as to justify the increased expenditure. I enclose, for their Lordships' information, copy of a letter* from the Crown Agents for the Colonies, enclosing a memorandum from the Consulting Engineers, which shows in detail how the reduction in the estimate has been arrived at.

5. As regards the wharf at Baro, Sir F. Lugard considered that the provision of £560 would be sufficient for such simple works on the river bank as would be necessary to facilitate landing. Sir Percy Girouard's experience in landing very large quantities of permanent way material and rolling stock on the banks of the Nile, where the rise and fall of the river is at least as great as that of the Niger and where no wharfage accommodation was provided, was of a nature to support the opinion of Sir F. Lugard.

6. Lord Elgin does not understand that there is any difference of opinion as to the navigability of the Niger at and below Baro, or as to the carrying capacity of the river at different seasons of the year. There is available as a guide the experience of many years' navigation at all seasons, and, although it is true that an abnormal rainfall or drought may create variations in any particular year, yet the general facts may be regarded as established. At Baro in an average year the available draught is as follows:—

12	feet	for about	2	months.
$3\frac{1}{2}$	„	„	8	„
$1\frac{1}{3}$	„	„	2	„

7. Baro was selected as the river terminus of the new line, because it was a point above Lokoja sufficiently accessible to navigation, and because an examination of the river bank above Baro and below the mouth of the Kaduna had failed to disclose any spot where the engineering difficulties would not be considerably greater if it were decided to begin the line there.

8. Now that the opportunity of beginning the construction of the line at high water this year has been lost, no further inconvenience can arise from the delay of a few months, and it is no doubt, in these circumstances, desirable that the proposals submitted by this Department in the letter of the 28th of February† should be considered again by Sir Percy Girouard in the light of local information and experience. It is not, however, proposed to involve the Protectorate in the expense of making fresh surveys of routes already so exhaustively examined, nor to ask the Consulting Engineers or the Director of Public Works in Northern Nigeria to prepare any further estimates than those which they have already submitted in complete detail, unless the High Commissioner should himself come to the conclusion that the policy of a Northern Nigerian Railway based on the waterway of the Niger is in principle undesirable. It may, therefore, be assumed that any report which may be received from the High Commissioner during the next few months will be couched in general terms, and will deal with the questions of policy involved rather than with any detailed methods of execution.

9. I am also to observe that, if no decision is arrived at on this subject during the present Session of Parliament, the same difficulties with regard to the necessity of Parliamentary discussion and sanction will arise next year as have arisen this year.

I am, &c.,
R. L. ANTROBUS

No. 14.

THE GOVERNOR OF SOUTHERN NIGERIA to THE SECRETARY OF STATE.

(Received June 8, 1907.)

MY LORD, Government House, Lagos, Southern Nigeria, May 10, 1907.

I HAVE the honour to forward herewith copy of the report made by the

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* No. 9. † No. 10.

Commercial Intelligence Officer on his recent tour in Northern Nigeria to study the trade routes, conditions and volume of trade leading from the Ilorin, Nupe, Sokoto, and Kano Provinces of Northern Nigeria to and through the Western Province of Southern Nigeria to the port of Lagos.

2. My despatch, No. 195, of 26th ultimo,* transmitted Mr. Birtwistle's memorandum on the currency question. I therefore make no further comment on this subject.

3. I would call special attention to Mr. Birtwistle's strong confirmation (paragraph 14) of what I have always urged, namely, that for the rapid development of trade in Northern Nigeria it is essential to give ready access to Northern Nigeria from Lagos, the chief commercial port of Southern Nigeria and of West Africa. Lagos is the only large commercial town in Southern Nigeria if not in the whole of West Africa, British and foreign. Travellers to West Africa, except those landing at Lagos, never see the town, and, therefore, the only reports of the importance of Lagos as a commercial centre are those furnished by official and unofficial persons stationed at Lagos and these reports are always discounted as biassed. It is generally a revelation to people familiar with other parts of West Africa to visit and see the commercial activity evident in Lagos.

4. When the Lagos bar is removed and ocean steamers enter the port of Lagos, this ignorance of the conditions prevailing here will cease, for passengers travelling up and down the coast will land at Lagos and realise its commanding commercial position.

5. Native traders from Lagos are found throughout the length and breadth of Southern Nigeria and in many town of Northern Nigeria also.

Give direct communication with Lagos and they will spread all over Northern Nigeria and will also be supplemented by enterprising native traders from the Gold Coast. It is, however, in European commerce that Northern Nigeria is so sadly deficient. The only firms at present carrying on any extensive trading operations in Northern Nigeria are the Niger Company, Limited, and Messrs. John Holt, and, being free from any serious competition, they carry on their businesses in the way that all firms will, unless they have the incentive of severe competition. Once place Northern Nigeria within touch of Lagos by railway and the European firms in Lagos will open branch establishments at all the large places in Northern Nigeria which that railway touches. To support this statement I instance Oshogbo, where, within a week of the opening of our railway, no less than eight different European firms had taken up sites for mercantile establishments.

6. I am confident that the same thing will happen at Ilorin and on the Niger when our railway reaches that river, but it will not happen when a railway is constructed from Baro to Kano unless that railway is connected with the Lagos Railway, for, as I have pointed out previously, giving only a transport service by river (to Baro or elsewhere) and a railway on to Kano, &c., in order to trade at Kano it will be necessary for a firm to have a base at Forcados and to have a responsible officer always in charge at Kano, while, if the Lagos Railway goes to Kano, the establishment at Kano will merely be a branch of the establishment at Lagos, with an assistant in charge, and goods can then be sent as required from the firm's Lagos stock, within a few days of their being requisitioned for, and not a tenth part of the capital will be required to carry on business at that place to what would be required without the railway connection.

7. It is interesting to note Mr. Birtwistle's opinion regarding the King's head on the subsidiary coinage; it agrees with my own. The same contention that was raised in Northern Nigeria was raised in the East against having the Sovereign's head on coins, but it was proved in the East that the users of the coin, Mohammedans, Buddhists, or Christians, had no objection to the head, provided the coin was of good metal and passed current everywhere.

8. I consider Mr. Birtwistle's suggestion in paragraph 7 that either Administration, Northern Nigeria or Southern Nigeria, should have an opportunity of expressing its views upon any measures affecting trade or traders is a good one. I also think that it would be well if hawkers' licences in Northern Nigeria were

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* Not printed.

abolished, especially as they only apply to "foreigners." Absolute freedom is given in Southern Nigeria to traders from Northern Nigeria, and surely "amalgamation" might be so far anticipated as to cease designating natives of one part of Nigeria as "foreigners" in another.

9. I would also express complete concurrence in Mr. Birtwistle's opinion that the class of small native traders should be encouraged and increased. A large portion of the trade of the country must always depend upon these small traders and cannot be dealt with by either native shops in towns or European trading establishments.

10. Regarding taxation upon trade in Northern Nigeria I deprecate any system under which the amount of the tax and its collection has to be left to native collectors, free from the close supervision of European officers, and I would avoid, as far as possible, any double levying of taxation on imports at the coast and again at an inland frontier, save at certain points where supervision is easy, and then only on a very few articles of general consumption such as salt and kolas.

11. I think it should be possible to arrange for the collection of customs dues on account of Northern Nigeria at the coast and thus avoid the great objection to a second tariff frontier; but a better system, the only possible one that I can foresee to enable the Administration of Northern Nigeria to be carried on without help from the British taxpayers, is to collect an export tax at the coast on three or four of the principal articles of Nigerian commerce, making all imports free throughout Nigeria as soon as the coast import tax has been collected.

12. I agree with Mr. Birtwistle that a regular river service with reasonable freights should be initiated and maintained in addition to the extension of railways; the railway service is not run at a loss and in fixing the rates for the river service care should be taken not to fix them below cost.

13. The penny per ton per mile proposed by Mr. Birtwistle in paragraph 12 (*f*) for river transport is very desirable, but I doubt the possibility, at any rate under present conditions, of carrying cargo so as to cover expenses at this low rate.

14. In connection with the river service I would point out the desirability of a monthly direct cargo and native passengers' service from Lagos to Lokoja and to all ports on the Niger up to the terminus at Lokoja.

15. Paragraph 17, dealing with the population of Northern Nigeria and the sketch map showing the distribution of population as reported by Sir Fredrick Lugard in his report on Northern Nigeria for the year 1904,* is interesting and shows how unevenly the population in that Protectorate is distributed and also that, although the Lagos Railway, taken viâ Jebba to Kano, would have to pass through a long tract of thinly populated country if the Jebba route is adopted, still Mr. Birtwistle considers there is ample justification for the line to Kano by this route.

16. I would strongly urge that whatever route is taken, when a decision has been arrived at, the construction of the whole line should be undertaken and not section by section, as the line cannot pay until the large centres of Zaria and Kano are tapped.

17. I have on several public occasions drawn attention to the possibility of a considerable trade in ground-nuts now our railway has reached the drier regions of the interior where this product can be grown profitably. I am glad to say that my remarks seem to have led to a considerable increase in the quantity planted this year at Abeokuta, Ibadan, and Oyo, and a special low freight has been arranged for this product on the railway.

18. The almost complete absence of European goods in the native markets in the Sokoto and Kano Provinces, referred to in paragraph 28, can only be due to the prohibitive cost of transport by head carriage. This has been considerably lessened in 1907 by the abolition of the caravan tolls, but until a railway taps the interior, it is not likely that European goods to any great value will ever be imported.

19. With regard to paragraph 30 of the report, details of the successful sale in Lagos of the skins brought down by the caravan from Katsena are given in my despatch, No. 238, of 10th instant,† and is entirely due to the careful arrangements made by Mr. Birtwistle.

20. Mr. Birtwistle very properly draws attention to the security now enjoyed by traders travelling in the interior and the instance he gives of a woman travelling

* Colonial Reports Annual, No. 476.

† Not printed.

alone and saying she was not afraid since the white man made the road, is a most eloquent testimony to the usefulness of good roads and the appreciation of them by the people of the country. I have with my own eyes witnessed the change in various parts of Southern Nigeria, as soon as good broad roads have been completed; the most notable one being the way in which numerous natives from the interior to the East now visit the Niger port of Onitsha, travelling along the road from Oka.

21. The present small amount of the much-talked-of trade between Kano and Tripoli is notable, and there is little doubt that it will entirely disappear as soon as communication with the coast is improved.

22. I am much indebted to the Acting High Commissioner of Northern Nigeria, Mr. Wallance, and his officers for the assistance given to Mr. Birtwistle during his long tour in that Administration. A copy of his report has been furnished to Sir Percy Girouard, the present High Commissioner, for his information.

I have, &c.,
W. EGERTON,
Governor.

Enclosure in No. 14.

REPORT by the Commercial Intelligence Officer for Southern Nigeria on a Tour made in Northern Nigeria January to April, 1907.

By arrangement made between the Northern and Southern Nigeria Administrations, I was, towards the end of 1906, instructed by Sir Walter Egerton to make a three to four months' tour in Northern Nigeria, and to subsequently report as to any points of interest affecting the development of the Protectorate. I accordingly left Lagos on December 31st, arriving back at headquarters on the 19th of April.

2. The route followed may be roughly described as a triangular one through the Central, Northern, and Western Provinces, viz., from Ilorin to Kano viâ Bida, Zungeru, and Zaria; thence to Sokoto viâ Katsena and Powa; and back to Ilorin viâ Ilo, Bassa, and Kaioma.

3. In weighing any conclusions I have drawn, it should be borne in mind that, although I have for many years been keenly interested in the caravan trade between Lagos and Northern Nigeria, I had no previous personal knowledge of the country beyond Ilorin, and that, owing to the limited time at my disposal, my observations and enquiries have (with the exception of the Kano Province) been necessarily confined more or less to main roads. It should also be remembered that I have not visited, and cannot speak even casually of those portions of the Protectorate below the Kaduna River, or east of Bida, Zaria, and Kano. With this qualification, I beg to submit the following as my views.

4. The paramount question upon which the future prosperity of the Protectorate hinges is undoubtedly that of transport. Whether considering the prospects of cotton-growing on a large scale, the exploitation of shea trees, the cultivation of ground-nuts or other produce for export, the return trade in manufactured goods, or—most material point—the bringing into the country of a sufficient number of merchants and traders to ensure fair prices for produce and well assorted stocks to tempt the natives to work, everything comes back to this one vital question of cheap and reliable transport, without which the outlook for the bulk of the country through which I travelled is practically hopeless, judged from a commercial standpoint.

5. The next most important matter after transport, and one calling for early local adjustment, is that of currency. The question is so far-reaching a one, and there are so many details connected with it, that I think it best to enclose a separate memorandum* dealing rather exhaustively with the subject. From this it will be seen that I believe the present tension may be relieved, and a permanent solution found, by the employment of official money-changers in the principal markets. Although the details of the scheme are my own, it is only right to say that the

* Not printed.

general idea of money-changers was first suggested to me in a chance conversation two years ago with Mr. Wilmot, the Manager of the Bank of Nigeria, at Calabar. I am also given to understand that Sir Frederick Lugard had some plan in mind for equalising the rate of exchange, and that he has written a memorandum on the subject. In view of the pending introduction of the new subsidiary coinage (nickel pennies and tenths of a penny), I think no time should be lost in drawing up some definite plan of action to ensure the popularising of these coins, and, if it is pertinent for me to offer the suggestion, I would say that I think much good might result from a conference between the High Commissioner and the residents. There are doubtless many other subjects of common interest which could be discussed with advantage at the same time.

With reference to the design of the new currency, although, until I made the Northern Nigeria tour, I favoured the idea of coins having a hole in the centre, I now strongly advise that both the penny and the tenth should have *two* holes, one at each side near the rim of the coin. My reasons for advocating the change in the design are:—

(*a*) that it will allow of the King's effigy appearing unbroken in the centre of the coin.

(*b*) that the holes will enable the natives to string the coins so that they will lie flat round their bodies or necks.

6. When we have transport and a stable currency most questions making for commercial development will adjust themselves. There is, however, one other broad subject which I feel that it is desirable I should refer to before passing on to details, viz., taxation. I approach this matter with some reluctance because it is a controversial topic upon some phases of which I have already expressed very decided views, and it may be thought that I am biassed. I recognize, moreover, that it is very easy to find fault, but extremely difficult to discover some entirely satisfactory solution of the revenue-raising problem with which the Northern Nigerian Administration was, and is, faced. And in view of the enormous amount of good which has been accomplished under the administration of Sir Frederick Lugard, and of the undoubted enthusiasm and zeal of his officers, it seems rather ungenerous to here refer even incidentally to mistakes which are inevitable in new countries, and to opinions which are still conscientiously held by some of the residents, but which I believe to be unsound. I can only say that I am not touching upon the question in any carping spirit, but because I am afraid that other errors of judgment tending to retard the development of the Protectorate's trade may be made unless consideration is given to one or two points at the present time.

7. Now that the caravan tolls and canoe licences have been abolished, I think that any new proposals for taxation in any way restricting the freedom of trade should be very closely scrutinized, and be looked at broadly from all sides before being approved. As the commercial interests of Northern and Southern Nigeria are so closely allied, it seems to me that it would not be out of place for one administration to send to the other copies of any draft ordinances or proclamations affecting trade or traders, inviting a candid expression of opinion regarding the contemplated legislation. For example, at the time the Lagos Government was a few years ago proposing to sanction provincial tolls (Abeokuta and Ibadan), no doubt the Northern Nigeria Administration would have been glad of the opportunity of expressing its views upon measures which tended to embarass the caravan traders passing through those provinces. Then, on the other hand, the Southern Nigeria Government might have been consulted before the caravan tolls and Hawkers' Proclamation—legislation which very closely affected coast interests—was enforced, especially in view of the substantial subsidy passing from the one Government to the other.

8. When returning through Ilorin early in April, I was rather surprised to learn that the regulations concerning hawkers' licences as applied to "foreigners" were still being adhered to, as I had hoped that these also would have been withdrawn along with the caravan tolls and canoe dues. The present arrangement means that any small trader not a native of Northern Nigeria wishing to do business in Ilorin, or presumably in any other part of the Northern Protectorate, must take out a hawker's licence at the cost of one pound per annum, whilst the native of Northern Nigeria can enter any part of Southern Nigeria and trade free. It appears to me an inequitable system, and one tending to curtail the number of small middlemen.

9. In some quarters I have found that the work of the itinerant Hausa trader (who is now exempt from the hawker's licence) is not appreciated, and that there still remains the feeling that he should be taxed somehow. It was generally (with one exception) admitted by the Residents with whom I discussed the subject that the caravan tolls were killing the small men's trade, and in some cases it was argued that this was not really bad for the country as they would be driven back to the land. I fail, however, to see the utility of forcing these small traders, who carry European goods, out of what has apparently been to them a remunerative occupation, and one working for the opening up of out of the way districts, to one in which (owing to want of transport) there would be no market for what they might produce if they took up farming. True, they might grow their own food and provide themselves with clothes from their home-grown cotton, but they would be taking nothing out of the country and bringing nothing in, which is what they are doing at present. In one of the small markets well away from the main road in the Kano Province, I saw a girl come up to one of these Hausa hawkers and buy a single bead for 10 cowries (equal to one-thirteenth of a penny in that particular district). Superficially this transaction may appear very trivial, but it struck me as being one full of significance as illustrating the natural vanity of the people, and the birth of artificial wants, upon which our trade in Northern Nigeria must so largely depend. No large trader would at present ever think of going to the market in question, or to any of the more remote townships, and it is only by the aid of these small men that we can cultivate trade in European goods within the present means of the poorer people, and so pave the way for the larger traders to follow. So long as the petty hawkers conduct themselves properly, they are, I think, entitled to the utmost encouragement from the Government, and whether natives of Northern Nigeria or of Southern Nigeria, I am of the opinion that no taxes should be imposed upon them.

10. Apart from trade dues, the general system of taxation in Northern Nigeria is so comprehensive and involved that even if it came within my province to review or criticise, I should need to spend a much greater length of time in the Protectorate before I could put forward any views with confidence. I will only state here that from all I have gathered there appears to be a good deal to be said in favour of the tribute (land, crops, cattle, &c., tax) when equitably assessed and fairly collected by the native rulers. As to whether the present incidence is too high or not high enough, it would be presumptuous for me to say, but whatever is thought fair now could undoubtedly be very materially increased in those areas falling within the influence of the railway when the line is constructed, and free markets for the disposal of cotton or other crops are available. And such increase should *not* be shared with the native chiefs, but be taken entirely by Government.

11. Personally, I should like to see no taxes whatever upon trade in Northern Nigeria, but if it is imperative that more revenue must be raised locally, and assuming that such increase cannot at present be fairly taken in tribute, and that it must come out of trade, I would, in preference to any individual trader's tax or general customs tariff, suggest an appreciable increase in the duty on kola nuts, which will stand it. There should, of course, be no revival of the caravan tolls system, but one payment only on the frontier made under strict European supervision. It has been suggested to me that the simplest plan for raising revenue by the aid of kolas would be for the Customs duty at the port of entry on the coast to be increased, and the equivalent earnings transferred from the Southern to the Northern Administration. I quite agree as to this being the easier method, and one not lending itself to abuses and extortion, but it has one serious drawback inasmuch as it would be setting up a protectionist tariff in favour of "Gbanja" kolas, which are now being freely cultivated in the Western (Lagos) Province of Southern Nigeria, to the disadvantage of the Gold Coast, the present source of the bulk of present supplies. From series of tolls' receipts which I have seen, it would appear that kolas going to the more distant markets (Kano, Bautchi, &c.), have been taxed altogether up to from 50 to 60 per cent. on the coast value, and that being the case, there would be no hardship in now on the frontier taking, say, 25 per cent. on Lagos cost, and I think it would be preferable to take even 50 per cent. or more on kolas than to charge any duty on cloth and other manufactured goods, or to increase the tariff on salt which already pays (Southern Nigeria and Northern Nigeria together) equal to about 200 per cent. on the cost in England. So far as my observations have gone, I conclude that whilst Kolas are more or less a necessity to the long-distance caravan traders when on the road, the bulk of the nuts going north are consumed in the towns and villages, and

may, therefore, be generally classed as a taxable luxury. It would be wrong to compare kolas with spirits, but nevertheless, they and salt are the best mediums we have for indirect taxation as applied to the Protectorate. And certainly the nuts may fairly be classed here in the same category as tea in England.

12. Measures for improving the facilities of carriage of produce and goods should, of course, include a regular river service with reasonable freights, as well as railways. During the last year or two greater prominence has been given to the demand for railways, but to my mind one is almost as important as the other, and both are essential. With regard to the river service I reported over a year ago as to the lower river (below Idah), and now, as all the Niger boats are being placed under the one administration, I beg to add the following suggestions:—

(*a*) That the service should be performed with regularity, and the time table dates be, so far as possible, arranged to serve the main line steamers at Forcados without incurring the expense of putting the goods or produce into store.

(*b*) That in addition to or in conjunction with the ordinary river run, we should have a monthly direct service for cargo and native passengers from Lagos (inside the bar) to Lokoja, the boats calling at Onitsha and other important river stations. It is most desirable that this service should be performed without transhipment.

(*c*) That the Marine Department and Residents should report as to any new trading stations which might be opened up with advantage, and be made ports of call, taking into consideration (1) forest produce and cultivated crops in the vicinity; (2) population and inland markets within reasonable distance; and (3) creeks or streams navigable (for canoes) opening out into the main river near the proposed new station. And, of course, land which is well above high-water mark, and with a suitable river frontage.

(*d*) That small native traders carrying "country" produce should be catered for, and be accorded easy freights.

(*e*) That Government assistance should be rendered in transporting new canoes from districts where they are readily obtainable at cheap rates to others in which there is no suitable timber, and

(*f*) That the rate of freight in the more easily navigable parts of the river should not exceed one penny per ton per mile all the year round (heavy goods by weight, and bulky ones by measurement).

13. Although my Northern Nigeria tour was almost entirely made by land, I worked down from Ilo to Bussa by river, and when making the passage it seemed to me very regrettable that the waterway should have no trading station for a distance of about 200 miles below the French boundary, that is between Ilo and Liaba, and that there should be so little traffic in the higher reaches. Between Ilo and Yelwa (a distance of approximately a hundred miles), I met in three days only seven canoes going up river. I understand that the rapids below Bussa prevent free communication with the lower river, and I have wondered if something could not be done either in the way of blowing up the rocks in the worst parts of the race, or of cutting a canal to work round them. In view of the pending improved river transport service and rail extension from Lagos to Jebba or some other point on the Niger, which would make the place of crossing an important river trading centre, from which branch factories could be thrown out by the Lagos firms, one would think that any reasonable expense would be justified in giving the Borgu and Kontagora Provinces cheap water transport, and I beg to put the suggestion forward for expert enquiry. If the Bussa length could be rendered less dangerous, I feel certain that a large increase in trade would soon be seen from the two provinces named.

14. Concerning railways, I am strongly of the opinion that whatever other main lines or branches are constructed in Northern Nigeria, the base of the Kano line should be Lagos. My reason for advocating this and the Lagos-Niger steamer service, is that it is the Lagos merchants and traders who are in the best position to open up Northern Nigeria properly and with the least delay, and I have little doubt but that they will do it when suitable transport is available. The following

points are to be noted concerning the advantages of Lagos as the most suitable base for the proposed railway:—

(*a*) Lagos is by far the most important commercial centre on the West Coast.

(*b*) West Africa is not in good odour with wealthy merchants engaged in trade in other parts of the world; consequently we must look to existing coast firms to open up these territories.

(*c*) In Lagos we have 15 important European houses (excluding Miller Bros.) which are not in any way "tied." In other parts of Nigeria there is no free and open market in the proper sense of the term, and the principal merchants below Lagos are members of a combine which has a non-competing treaty with the Niger Company. Apart from two or three minor merchants, there are at present only two wealthy firms engaged in trade in Northern Nigeria, viz., the Niger Company and Messrs. Holt, the first-named still enjoying a practical monopoly in many districts.

(*d*) In Lagos Town alone (not to speak of large centres of Abeokuta and Ibadan on the rail route), we have over 15,000 native traders (1901 Census), who are also "free."

(*e*) The only exports of any magnitude from the upper part of Northern Nigeria are at present native potash and livestock. It may be stated with some confidence that the Western (Lagos) Colony and Protectorate of Southern Nigeria consumes locally the bulk of the exports taken down by the caravan traders from Kano. If the Lagos to Kano line is proceeded with, all the large consuming centres, excepting Bida, will be touched, viz., Ilorin, Abeokuta, Ibadan, and Lagos, in addition to Oshogbo and other places of minor importance.

(*f*) The caravan traders from Kano, Sokoto, and Chad have for many years been accustomed to travelling overland to Lagos, and they know the advantage of its markets. On the other hand, the Lagos merchants and native traders have experience in catering for the requirements of the Hausa people.

(*g*) The Lagos trade is done entirely upon a cash basis, and both merchants and traders there are accustomed, owing to the keen competition which rules, to trade on narrow margins, and they do not believe in, or at all events do not act upon, the heresy that the less one pays for produce and the dearer one's goods, the more the producers will work.

(*h*) With regard to cotton-growing, upon which so much depends, cash alone, unaccompanied by a large assortment of miscellaneous goods sold at reasonable prices, will not afford that inducement for the natives to work which is so necessary if we are to see really important returns. With the terminus at Lagos, I feel sure that the merchants there will soon see that tempting goods are forthcoming near the ginneries, and that thus there will be a rapid expansion of both imports and exports.

(*i*) The Lagos line is already near the Niger.

15. Although I believe it will be a grave mistake not to have the base of the main line at Lagos, I think there is much to be said in favour of a branch to Baro or some other navigable part of the Niger viâ Bida. Whilst cotton and manufactured goods may stand the through rate to and from Lagos by rail, I doubt if coarse produce, such as ground-nuts and shea nuts, would, and hence, I think that, apart from bringing the important trade centre of Bida and a good stretch of the Nupe Province within the influence of the rail, it would be wise to have the branch, which could also relieve any possible congestion on the main line. But for the miscellaneous goods and proper competition, which are so very essential, we undoubtedly need direct communication with Lagos.

16. As already stated, I have not visited the Eastern Province, so cannot speak with any authority as to the suggested line from the eastern part of Southern Nigeria to Chad, viâ Bassa, Nassarawa, and Bautchi, but from the official returns as to population in the various provinces, to which I shall refer in the next paragraph, such a line would appear to have every prospect of being remunerative.

17. There has been, and I think still is in many quarters, considerable misconception with regard to the population of Northern Nigeria, and especially with reference to its distribution. Coming down from the time when Barth estimated the Hausa State alone at from 30 to 50 millions, we appear to have held very exaggerated ideas concerning the total number of inhabitants in the Protectorate, which alone a few years ago was officially set down as 20 millions. The first approximately reliable estimate of the present day population is, I think, to be found in the Northern Nigeria Report for 1904, when Sir Frederick Lugard, with the information then at his command, fixed the total at about 10 millions. Although it would be absurd for me, upon so short an acquaintance with the territory, to offer any opinion as to the total, regarding which there is still considerable divergence of opinion, I think it may be useful if I enclose a sketch map* based upon the 1904 report, which shows at a glance how unevenly the population is distributed. From this it will be seen that, unfortunately, in order to reach Kano from Jebba or some other place on the middle Niger, the railway will have to pass through a long stretch of country in the Zaria Province where there are very few people, and from which section appreciable returns cannot reasonably be expected for some years.

18. Notwithstanding the fact that my tour through the central and lower parts of Zaria was extremely discouraging, owing to the aforementioned reason, I am, after spending three weeks in the Kano Province, glad to be able to say that I consider there is ample justification for the extension of the Lagos Railway to Kano. I should explain that, in this instance, I not only saw the country from the main roads Zaria to Kano and Kano to Katsena, but that I spent a week travelling over bush paths due south of Katsena. The whole line from the Niger may not pay for some years after construction is completed, but I consider that the profits from the section Zaria to Kano, and the branch lines which could be thrown out therefrom, would soon go a long way towards making up the probable deficiency on the lower portions. From Zaria on to the north, we have an enormous and very capable farming population—larger than that of the whole of the Western (Lagos) Province of Southern Nigeria—which at present has no outlet for any crops beyond those grown for local consumption. Other too highly coloured pictures may have been drawn of Northern Nigeria, but in travelling through the districts quoted, I felt that there had been but little if any exaggeration and that it was indeed a wonderful agricultural country. The same might be said of the Sokoto Province, but although in time I hope that the north-west corner of the Protectorate—which politically is perhaps the most important—may be accessible by rail, it is not, in my opinion, and speaking only from a commercial point of view, a question which it is so imperative for us to consider at the present time as is the Kano extension. I say this because, whilst the Sokoto people are good farmers and have an equally fertile country—an even more suitable one for crops needing irrigation—their main source of wealth lies in the raising of cattle, for which they have already a fairly free and remunerative market in the Western (Lagos) Province of Southern Nigeria, which they can reach in about two-thirds of the time occupied in the journey from Kano to Lagos. Then again the population, according to official returns, is only one-fifth as dense as that of Kano. Sokoto, nevertheless, stands out in my recollection as the richest of the provinces through which I travelled.

19. With regard to the very thinly populated tract below Zaria Town, I think it will be readily admitted that the railway will afford the best means of inducing the people to return to the land. Without it, and the resulting free market for such crops as the newcomers may cultivate or indigenous forest produce they may gather, the re-population of such a district will be at best but very slow and unsatisfactory work. One point in connection with this at present practically unproductive stretch of country may be noted and that is, owing to the shorter rail mileage and presumably lower freights, the merchants would probably be able to pay from 20s. to 30s. a ton more for produce in the Central and Lower Zaria Province than, say, at Kano. This difference on coarse produce other than cotton is a very appreciable one, and one would think that it ought to materially assist in bringing the natives back.

20. It is a fortunate circumstance for Northern Nigeria that the people of Lancashire are now fully alive to the importance of enlarging the field of supply

* Not reproduced.

of raw material for their mills; and I think it is equally fortunate for them that in Northern Nigeria the British Cotton Growing Association is likely to see some tangible and permanent results. Cotton not only can [be], but is and has for generations been, grown successfully enough in the Kano and Upper Zaria Provinces alone to find clothes for considerably over a million people; probably more than two millions when one takes into account the cloth carried away by caravans to other districts. After giving careful attention to the matter when in the Kano Province, and being particularly observant when in the small towns away from main roads, I estimate that not more than two per cent. of the clothes worn by the natives in that district are of European manufacture. The Northern Nigeria 1904 Report fixes the population of the Kano province at two millions, but not all these people wear an appreciable quantity of cloth, and some of the poorer people in the farming villages in the western part of the province are to be seen with only a skin waist covering. Against that, however, must be set the fact that what, for want of a better way of describing them, may be termed the middle and upper classes, wear a greater number of clothes in the way of gowns, &c., than do the natives of the Lagos Province of Southern Nigeria. There is no doubt whatever as to cotton being one of the staple crops in the districts quoted, and if only we can have the railway, I am of the opinion that when the natives realise that they can dispose of any quantity immediately when gathered—a thing they do not at present understand—they will very largely increase their areas. I also believe that the farmers will sell the cotton freely at a price which will be remunerative to the buyers after paying a liberal rate of railway freight. It must not, however, be assumed that by running a railway to Kano and establishing buying centres and ginneries, we shall secure the whole or even the bulk of the present production of cotton for Lancashire. The spinning and weaving industries are so firmly established in every town and village—one might almost say in every compound—around Kano, that, in my opinion, a large share of the present crops will be kept for home use. It will be many years before the coarse but pure and strong Kano cloths are displaced by Manchester goods; and it is mainly to new and increased areas that we must look for our large supplies of the raw material. We may, however, start out with the knowledge that our task is not the difficult and uncertain one of establishing a new industry, but only the expansion of a very old one.

21. In considering what new measures might be adopted with a view to extending the cultivation of cotton along the railway route, and in particular of establishing the industry on a sound basis in the at present very sparsely populated tracts of country in the Zaria province, I have given some thought to the feasibility of employing European capital in the way of land and ginning companies which would let out small holdings on the half, third, or quarter principle, a practice which is, I believe, common to many of the cotton-growing States in America. I am not sufficiently well posted as to the probable yield per acre to express an opinion as to what would be a fair share of the proceeds of crop for landlord and tenant, respectively, but the idea roughly outlined would be to offer the following and possibly some other inducements:—

The landlord to provide, say—

(*a*) 20 acres of land to be cultivated on joint account.

(*b*) A house and plot of 40 or 50 yards square to be fenced off for the tenant's exclusive use and benefit (compound, house, and vegetable patch).

(*c*) A central "Chop" market within reasonable distance of each holding. During the first year, the landlord to arrange for supplies (tenants of course paying for them at reasonable rates). After the first season, it should not be necessary to bring ordinary foodstuffs from outside.

(*d*) Hoes, matchets and other implements.

(*e*) Seed.

(*f*) One shilling per week subsistence allowance. More could be given at the discretion of the estate manager when he knows his man and probable yield, but in such events the extra amount to be posted to debit of tenant's account.

The tenant to find all labour, including clearing of bush, fencing, making and upkeep of roads on his frontage, and to deliver the seed cotton at ginnery on the estate. When crops are being gathered, the weight of daily pickings delivered to

ginnery to be entered in a tenant's pass book retained by the farmer, and when all is reaped a balancing of accounts to be made, the tenant receiving either such share of the current value of crop or a certain price per pound, as may be considered equitable by the local Government; any advances made over and above the fixed rate of subsistence money to be, of course, deducted from the amount due to tenant. Landlord to pay all Government or other taxes, the tenant being quite free. In the event of ploughing being feasible, as I think is not improbable in many districts, the landlord might provide bullocks or donkeys and ploughs, enlarge the tenants' areas, and take a greater share of the proceeds of crop. I may say that I have little or no faith in European plantations run in this country by labour paid by the day, but I believe the part proceeds arrangement would not only safeguard the capitalists' interests, but that it would turn out a better type of people than the other. It would, of course, be necessary for a common form of agreement between landlord and tenant to be approved by Government, which on the one hand would prevent the former from acting harshly, and on the other would enable the landlord to get rid of lazy or otherwise undesirable tenants. It should also be stipulated that, in the event of the ginning companies opening trading stores, it shall not be compulsory for the tenant to deal there, and all settlements must be made in cash.

22. Concerning cultivated crops for export other than cotton, I am inclined to think that ground-nuts will take second place, provided the trade is not strangled by over-high freights. All along the road from Ilorin to Kano, wherever there was a small market ground-nuts were, almost without exception, to be seen on sale, and the finest I noticed were being gathered so far north as Kudon, beyond Zaria. I am not quite certain of it, but believe I have read in some cotton publication that ground-nuts make a most suitable crop for growing in rotation with cotton, in which event one would think a free market for the nuts would be doubly appreciated. In addition to cotton and ground-nuts a considerably diversified range of crops is grown in the various districts along the route Ilorin to Kano, viz., guinea corn, millet, rice, "Alkama" (a species of wheat), sweet potatoes, koko yams, cassava, sugar cane, onions, peppers, tobacco and dye plants, but I doubt if any, excepting perhaps peppers and dyestuffs, could be profitably exported to Europe, although doubtless a local trade per rail to Ilorin, Abeokuta, Ibadan and Lagos could be worked up in some of them, rice in particular. The fine tobacco farms in the Katsena sub-province are worthy of mention, and one would think that, if properly cured, an important coast trade could be established. Strange to say, I saw no maize further north than Bida.

23. Although I believe that cotton will prove to be the principal "down" freight for the proposed railway, this report would be incomplete without some reference to the prospective business in the produce of the shea tree, which is to be found in many parts of Northern Nigeria. Whilst it is an exaggeration to say that the tree abounds along the whole route of the suggested railway, there is no doubt that there are vast numbers of them on the road referred to, and that in course of time, given cheap transport, shipments of shea nuts or "butter" will figure largely in our export list. From the country below Ilorin up to so far north as Kano, one sees great numbers of these trees in many of the districts traversed, which, however, away from the river, are contributing nothing to the trade of the Protectorate, and even near the Niger very little owing to the lack of European competition. So far north as between Zaria and Kano, or, to be more exact, between Kudon and Karia, there is a fine belt of shea, and from the number of blossoms when I passed (February, 1907), I conclude that the trees in that part must be extraordinarily prolific. One point struck me in travelling through the length of the Zaria province (where many of the shea trees are at present stunted, owing presumably to the annual bush fires underneath), namely, that when this district is being repopulated and farm clearings made, it should be rendered illegal to cut down the shea tree, which in course of time will, I am certain, be a valuable asset to the farmers, and a source of much revenue to the railway.

24. A very inadequate idea of the resources of the northern districts would be conveyed if I failed to mention the great extent to which the raising of live-stock is undertaken, especially in the Sokoto district. On the road from Bida to Wushishi I passed several thousands of sheep and goats in addition to a considerable number of bullocks from the Kano province which were being driven south mainly to fill a demand for butchers' meat in the lower parts of the Protectorate and in

Southern Nigeria, especially in the Western (Lagos) Province. Some conception of the numbers annually raised may be gathered from the tanned-skin business, which, of course, represents only local killings. According to the Northern Nigeria 1904 Report, about 300,000 hides (sheep and goats) were exported during that year from Kano alone; and with regard to stock raised in the Sokoto province, an official and reliable census of the herds has recently been taken for assessment of tribute, and I was informed by the Resident that over one hundred thousand head of cattle over a year old were entered in the Sokoto division of the province alone. In addition to cattle, sheep and goats horses and donkeys are bred, and one sees along the road even small herds of camels. Although I passed a few mules which were being used as pack animals on the caravan roads, I saw none grazing on the farms, and it would not appear that the natives appreciate this hybrid. I saw no ostriches on the tour, but was informed that they were farmed north of Kano. Apart from the demand for butchers' meat in Southern Nigeria, supplies of sound bullocks are already taken by the Northern Nigerian Transport Department, and as the construction of roads goes on both in Northern and Southern Nigeria, it is probable that a steady demand for draught animals may be created, especially in view of cotton being grown on a large scale. But the reliable outlet for bulk will undoubtedly lie in the call for fresh meat. It is very fortunate for the breeders that we have in Southern Nigeria so large a field for the consumption of stock, and it is equally satisfactory for the inhabitants of the districts near the coast, among whom meat eaters are largely on the increase, that a reliable source of supply should be within their reach.

25. As suggested by Mr. Wallace I visited the iron pits and smelting furnaces near Powa (between Kano and Sokoto). I have unfortunately but a slight knowledge of prospecting work, and am not qualified to express an opinion as to the probability of minerals of greater value being found on the route traversed, but, in view of all the discovery would mean to Northern Nigeria, I certainly think Government would be justified in sending out a mineral survey party to investigate the resources of the central and western parts of the Protectorate. Up to the present time only a small area in the eastern provinces appear to have been officially prospected.

26. Whilst I do not think the iron deposits are likely to be of any value to us, at all events not for many years to come, they and the process of working the metal are very interesting as indicating how independent these northern natives can be of goods of European manufacture and how entirely self-supporting the districts are. I have already referred to the fact that the people are great agriculturists and consequently grow and rear all their foodstuffs. And here we find that they do not need to go outside for the metal to make their farming implements, but are able to provide themselves not only with rough tools (hoes, &c.), but knives, scissors, and even razors from the iron found in the country, and which by some process they are able to turn into steel. They make their own earthenware water and cooking pots, and even smoking pipes. They are really expert tanners and leather workers, and turn out excellent sandals, slippers, riding-boots, &c., in addition to saddles and horse "furniture" generally. They make their own ropes, fishing-nets, &c. Even implements used in their various manufactures—cotton gins, spindles, looms, shuttles, &c., are all home made. They grow their own dye-stuffs and their own tobacco, and from the ground-nut they make oil for lighting and cooking purposes; and I have even seen candles made from beeswax. Truly a wonderful country, and a wonderful people to be found for four or five hundred miles away from the coast line!

27. It is obvious from the foregoing paragraph that it will be mainly by creating new wants that we can hope to greatly enlarge our business with Northern Nigeria in British manufactures. If the people generally were apathetic this would prove a formidable task, but, so far as my observations have gone, I believe that the natives of the northern part of the Protectorate have quite as much vanity as their fellows on the near seaboard. All they want is on the one hand an outlet for what they are capable of producing, and, on the other, to have an attractive assortment of goods put before them, to work to acquire such as take their fancy. I believe that per head of population, when this country is properly opened up, they will take a larger proportion of imports of British origin than do the natives of Southern Nigeria, a great share of whose earnings is spent in Continental spirits, which are of course prohibited in the northern Protectorate. What is clearly wanted is more

European competition, and we can never hope to have that to any great extent without transport. The merchants have been blamed for not being more enterprising in the way of opening up trading stations in the interior, but, in the absence of high-priced exports such as rubber or ivory, I see no justification for the employment of capital which would soon be eaten away by the present cost of porterage.

28. A few words concerning the important caravan trade worked between the upper parts of Northern Nigeria and Southern Nigeria and the Gold Coast hinterland may not be out of place. It is not possible to give exact figures showing the magnitude of this particular business, which is mostly confined to kola nuts, native "potash," live-stock, and skins, and is at present worked entirely by head and animal transport (pack loads), but the Resident of Ilorin informs me that he estimates the total trade entering his station in 1905 at £200,000, that is the value of the imports and exports together (local value). Ilorin is by far the most important station on the caravan route, and whilst it must be remembered that some proportion of the above total represents goods carried up by Lagos traders for local consumption in the Ilorin province, and cannot therefore be taken as caravan business proper, it must not be forgotten that a number of Hausa traders pass down to Southern Nigeria by routes west and east of Ilorin, and to the northern territories of the Gold Coast viâ Ilo. Figures given to me by the Residents of Bida and Jegga show that the total value (local assessment) of European goods which passed through those stations (including Kaseogi in the Nupe province) during last year *did not exceed* £15,000. As these three toll stations were undoubtedly the most important ones north of the Niger (the Kano and Sokoto traffic passing through them), I think we may safely say that all told £30,000 would cover the value of European goods passing from the south into the central and northern provinces of Northern Nigeria. To give one illustration, which will perhaps indicate more clearly than anything else I could mention, the enormous field there is open for our manufactures, I may say in almost all the minor markets, viz., apart from the towns of Kano and Katsena, which I visited in the Kano province, there was not even a box of matches to be seen on sale. Even in the Sokoto province, where the people are in closer touch with Lagos and admittedly do well out of their live-stock consignments, and where there is a certain air of prosperity, I found that during January and February this year (two of the principal caravan months) the proportion of European goods to the total imports cleared at Jegga was only 4 per cent.

29. Whilst the above figures are very unsatisfactory so far as British manufactures are concerned, it must not be forgotten that only now for the first time is the caravan trade having a fair chance. Apart from difficulties in Northern Nigeria, tribal disputes between the Ilorins, Ibadans, and Jebus made the business a very risky one up to 15 years or so ago. Then later the Niger Company set up a tariff hostile to Lagos and harassed the traders by attempting to force the trade into their own hands on the river. And after that we had the caravan tolls, which have just been abolished.

30. Concerning the "down" caravan trade, there is nothing whatever from the central and northern provinces exported to Europe through Lagos excepting tanned skins. This was an unknown trade on the coast line a few years ago, but now several of the Lagos merchants are open to buy any quantities which come through, and very full prices were realized for a caravan of skins which recently arrived from Katsena.

31. I wish here to add my personal testimony as to the security now enjoyed by traders travelling from one part of the protectorate to another. Throughout the whole of my tour, which included about a thousand miles of roads in the height of the caravan season, only one case of robbery was reported to me. Considering the nature of the country, I think this speaks volumes for the work accomplished in so short a time by the Residents and staff generally. In a wild part between Sokoto and Kano, I saw a Lagos trader travelling quite alone, and in the Zaria province I met a woman, also alone, on a very deserted stretch of road. She was going a distance of 22 miles, and when I asked her if she was not afraid, she answered "No, not since the whiteman made the road."

32. One point of interest in connection with the caravan trade lies in the fact that as the rail gradually takes hold of the existing business, we have at hand in the central and northern provinces better machinery for feeding the line in the way

of camel, bullock, and donkey transport, than exists over the present length of the Lagos Railway. Consequently we may safely assume that a far greater area on either side of the line will come within the influence of the railway than in Southern Nigeria, where everything is head-borne. At present the Hausa traders travel from three to six hundred miles each way to find a market for their merchandise, and, when we have the rail, I believe they will gladly work cotton through for 100 miles or more to the line.

33. The markets of both Kano and Sokoto were very disappointing as regards the quantity of European goods seen in them, and although I am aware that a considerable amount of wholesale trade is transacted in compounds away from the public markets, I am of opinion that the importance of Kano as a distributing centre for European goods has been greatly exaggerated. I have already referred to the comparatively small quantity of manufactured goods carried north by the caravan traders from Lagos, and with regard to the business coming through from Tripoli to Kano, there remains but little for us to capture. I am inclined to think that the desert caravan trade has also been much over-rated. The Kano Customs returns for last year (1906) show only £6,000 entered from the north, to which must be added the imports per Parcel Post. No separate account as to the origin of the latter has been kept, but, assuming that half of the whole came from Tripoli (which the Kano Postmaster thought would be a fair estimate), it means that all told, viz., caravan and post together, the total value of Tripoli goods now entering Kano does not exceed £10,000 per annum (cost price Tripoli and not local value). And as only small quantities of Tripoli goods were to be seen either at Katsena or Sokoto, I think we may take it that the total imports into the whole of Nigeria from Tripoli now fall short of £25,000. The fact that the principal Arab merchant in Kano is now consigning his skins to Manchester and London, and that one of the Tripoli merchants has removed to Manchester, indicates clearly that the north-coast caravans are being rapidly displaced by direct imports or exports from and to the United Kingdom. Two reasons may be assigned for this, apart from the disadvantage of danger and distance of the desert route, viz.: (*a*) the fact that the Lagos merchants found a free market for Soudan skins in England, and (*b*) the facilities offered by parcels post from Kano. With reference to goods which are still imported from Tripoli but which we might very well supply, I will see that our merchants are fully posted. I have a complete list of the Tripoli goods entering Kano, but there are very few lines of bulk.

34. In concluding this report, I can only reiterate the opinion expressed at the beginning, viz., that all other measures for the development of Northern Nigeria are of minor importance as compared with the large and initial one of transport, without which I see very little hope for the country. Given reasonably cheap river and rail services, however, I believe that in time the Protectorate will be of more service to the mother country than any of our West African possessions, but we must not expect too much in the early years.

C. A. BIRTWISTLE,
Commercial Intelligence Officer for
Southern Nigeria.

April 27, 1907.

No. 15.

TREASURY to COLONIAL OFFICE.

(Received June 12, 1907.)

[*Answered by No.* 17.]

SIR, Treasury Chambers, June 11, 1907.

I AM directed by the Lords Commissioners of His Majesty's Treasury to acknowledge the receipt of Mr. Antrobus's letter of the 16th ultimo,* further respecting the proposal that a sum of £375,000 should be provided from public funds for the construction of a pioneer line of railway from Baro to Zungeru in Northern Nigeria.

In reply I am to say that, while my Lords take note of the explanations given by the Earl of Elgin in regard to the points alluded to in Treasury letter of the 30th March last,† they will await the report to be furnished by the High Commissioner,

* No. 13. † No. 12.

Sir P. Girouard, before forming an opinion as to the expenditure either immediately or ultimately involved.

I am to add that any decision to be hereafter arrived at by this Board must be governed, not only by the High Commissioner's report and any further representations of the Secretary of State, but also by general financial considerations based on the heavy and important claims which the Exchequer may be called upon to meet in respect of the public service as a whole.

I am, &c.,
WALTER RUNCIMAN.

No. 16.

THE HIGH COMMISSIONER OF NORTHERN NIGERIA to THE SECRETARY OF STATE.

(Received July 1, 1907.)

[*Answered by No.* 25.]

Government House,
Zungeru, Northern Nigeria, May 30, 1907.

MY LORD,

I HAVE the honour to forward herewith a report upon a proposed transport policy for Nigeria.

2. Though the question more immediately affects me in its application to Northern Nigeria, in compliance with your instructions every endeavour has been made to take a wide view of the question and to embrace past and future considerations for Nigeria as a whole.

3. I have not found it necessary to enter into such details for Southern Nigeria as for the northern Protectorate, The age of the Colony, the presence of existing railways, and the available statistics have, I trust, allowed me to present in a fair and impartial spirit what appears to be the best policy for the southern portions of Nigeria.

4. The conclusions with regard to the south-west have, moreover, been based upon a close study of the records of the Colony, upon a visit to its principal port, and an examination of its railway system.

5. In studying the question previously, one great aid was lacking in the entire absence of any detailed information of the practicability of the Niger navigation or the suitability of its seaport, Forcados. It has always appeared that, if navigable, this great waterway must form the cheapest part of any transport route to the far interior. I trust that the statistics furnished by the attached report and its enclosures may afford the information necessary for agreement with my previously expressed opinion, now firmly established, that the Niger provides the most efficient transport route to the interior, and that by reliance upon it the northern country will establish its most economical outlet for trade. Granting this assumption, it would follow directly that the portions of Northern Nigeria at present practically cut off from development will find relief by a system of railways based upon the Niger and evacuation by it to the sea.

6. I would not imply for one instant that connection should not be sought with other sytems of rail transport developing or to be developed in the littoral, but from Baro, the best point on the Niger for an original railway base, to the sea rail carriage will never, in my opinion, compete with the river in the import or export of bulky goods or staples. In this regard I had the advantage of meeting the Governor of Southern Nigeria. I had hoped to have discussed this report with him prior to his departure, and beg to suggest that it should be forwarded to him for his views.

7. After a visit to the north-eastern portion of this Protectorate as far as Kano, I have become more deeply impressed with the agricultural condition, the industry, and trading instincts of the large population, and the practicability of great development in its staple products—cotton, ground-nuts, shea butter, and skins—at present almost untouched for export purposes. Should such a development be undertaken, and railways alone will effect it, it will ultimately, though perhaps slowly, place the Protectorate in a more satisfactory financial position, provide new openings for British trade, and, what is perhaps most important, a source of production of raw cotton in large quantities. On the other hand, should there be any prolonged continuation of the present policy of inanition, there might

accrue, to a population which should and can be converted into a highly prosperous community, most unfortunate political and moral effects.

8. Examination of the country has also confirmed the view that any railway system for the northern provinces should be of a pioneer description, the capital expenditure consistent with the provision of lines which can economically work the traffic and yet be improved with the growth of trade, without sacrifice of original outlay. Such a policy will permit of the adoption of low rates, which, considering the geographical position of the producing provinces, are essential for primary or ultimate development.

Lines constructed at £3,000 a mile will allow of such rates, and such lines can be constructed as from Baro to Kano. The labour available in the country may, unless importation is resorted to, slightly delay the construction in the province contiguous to the Niger, but once the more populous districts of Zaria and Kano are reached no difficulty of this nature will be felt.

9. The surveys carried out in 1904 will be mainly followed, though there would appear to be every possibility of improving on them both as to distance and gradient. In this regard, I agree with the 1904 report that there would appear to be no reason to make Zungeru a compulsory point, its future importance not justifying the great expenditure necessary to placing it on the main line, which should seek the shortest and cheapest route, as between Baro, Bida, Zaria, and Kano.

10. The total distance would, on the existing surveys, be about 400 miles as from Baro to Kano, and I estimate with every confidence that an efficient pioneer line can be constructed between these points for the sum of £1,200,000.

11. I must not hide, however, from your Lordship the conviction that a partial construction of the line falling short of Zaria, 300 miles from Baro, will not alleviate the situation nor inaugurate the development of trade so essential to the prosperity of the country.

12. In addition to the above sum, which I strongly recommend should be expended over a period of three years—£450,000 in the first and second and £300,000 in the third—I would further recommend the provision of one river dredger and barges at a cost of about £30,000 or, say, £1,230,000.

I have, &c.,
E. P. C. GIROUARD,
High Commissioner.

Enclosure in No. 16.

REPORT ON TRANSPORT POLICY OF NIGERIA.

I.—THE HARBOURS OF NIGERIA.

The coast line of British Nigeria extends some 450 miles from French Dahomey on the west to the German Cameroons on the East. The coast Colony of Southern Nigeria occupies the entire sea littoral, Northern Nigeria forming the hinterland, and maintaining external communication by means of the Niger navigation, which at present reaches the sea through the Forcados branch of the delta.

In the west of the littoral and within the old Colony of Lagos, there are two rivers of importance, the Abeokuta and the Oshun. These rivers join to form a system of lagoons which break through into the sea at the town of Lagos.

In the east are the rivers of Southern Nigeria or the Niger delta. "They are locally known as the Palm Oil Rivers, and offer exceptional advantages for penetrating the interior. They are chiefly (delta) branches of the Niger, but those to the eastward (Cross and Opobo) have sources independent of that river. Although close to the sea and within tidal influence," the estuaries of these rivers are interconnected by a vast network of more or less navigable creeks and lagoons, which

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NOTE.—Most of this information is gleaned from Admiralty reports, and by reference Messrs. Elder, Dempster & Company's servants and the Marine Officers of Northern Nigeria,

by a small amount of artificial aid, would render an inland navigation close to the sea practicable on the whole length of the Nigerian seaboard.

Prevailing Winds.—The prevailing winds are from south-west and west. Lasting gales of wind do not occur, though tornadoes, which give ample notice of their approach, and are of brief duration, take place in the months between March and June, and October and November. During the season when the dry easterly wind, known as the harmattan, may be expected (December to February), dense mists are occasioned on the coast.

Currents.—The general direction of the ocean current is eastward, except during the harmattan season.

The ports of Nigeria may be considered under three heads:—

(1) Those serving the old Lagos Colony:—

(1) Lagos.

(2) *The Niger Ports,* serving the Niger Delta and Northern Nigeria by the River Niger:—

(2) Forcados (entrance of the Niger).

Sub-ports using Forcados:—

(2*a*) Warri;
(2*b*) Sappeli;
(2*c*) The Niger River.

(3) Those serving old Southern Nigeria in the district of Calabar:—

(3) The Calabar River.

These ports are usually formed by mouths of the Niger or other considerable rivers. In each is observable a scouring action more or less dependent upon the volume of water carried by the rivers and to a certain degree on the height of the tide. All are obstructed by sand bars, through which a channel of variable width and depth is maintained by the scouring action noted. Lagos alone has been technically reported upon with a view to artificial improvement, and certain harbour works have been sanctioned but not yet executed.

The volume of water carried into the sea by the various rivers has never been accurately determined, though probably the Forcados and Calabar carry most, the Lagos, Nun, and Opobo, the least. The action of the tide on the bars is greatest in the easterly rivers, and least of all on the Lagos outlet.

Description of Steamers.

The Nigerian ports are at present used by a fleet of ocean-going steamers of two classes:—

(1) Steamers of 5,000 to 6,000 tons and 19 feet to 21 feet draught;
(2) Steamers of 900 to 1,200 tons and 9 feet to 12 feet draught, known locally as "branch boats."

The larger steamers carry the export, import, and passenger trade from and to Europe, and can enter Calabar, Opobo (on light draught), Brass, and Forcados. Many of the vessels are built for the trade and are of large capacity for their draught, but, owing to the lack of water on the bars, speed has had to be sacrificed to cargo space. None of the larger boats can enter Lagos, and that port is served by means of "branch boat" services to and from Forcados, where goods are transhipped from the larger steamers.

There is an undoubted feeling that improved boats are required, more particularly for passenger service, and this can only be attained by providing greater depth of water on the bars; probably 23 feet to 24 feet would suffice for some years. In considering the present suitability of the Nigerian ports for this draught, it must not be overlooked that vessels, both out and back, are at their lightest draught at the furthest point—Calabar—and, therefore, the existing natural draught at that point will probably suffice for the time being. It is the intermediate ports of Brass, Forcados, and Lagos, which may require artificial improvement. Brass serves an important trade centre, and Forcados focusses the trade of the ports of Warri and Sappeli, as well as affording the main entrance to the Niger waterway. Lagos would be the last port of call in Nigeria, and if it is to be artificially improved, a depth of 24 feet should apparently be its ambition and necessity.

(1) *The Port of Lagos.*

Lagos River is the first permanent break in the coast line east of Cape St. Paul, and through it the periodic accumulation of the freshes in the coast lagoons finds a vent to the sea, occasioning a surf of no ordinary kind upon the bar.

"The limit draught of vessels crossing the bar is regulated from time to time to meet constant changes in the bar; in October, 1893, 7½ feet; in 1895 it was 9 feet; in 1896, 10 feet; and in March, 1907, 9 feet 9 inches. The entire breadth of the channel at the entrance is barely half a mile, and through it the lagoon pours out, about half ebb, such a volume of surface scum, of a deep brown tint and of a sickening odour,* as to spread to a *distance of three miles from the coast.* At all times there is a break across the bar, and sometimes steam vessels cannot cross. The bar is very treacherous owing to its continual shifting; the depth also altering as much as three feet in one week. The rise of the tide is about three feet on the bar."†

Lagos is the only harbour in Nigeria west of the Niger outlets. It is furthermore the only harbour which has been professionally examined. In 1892 Messrs. Coode, Son, and Matthews furnished an original report to the Crown Agents on the possibility of improving the condition of the bar, which blocked its entrance and did not permit of its use by the larger boats employed in the West African trade. In this report the engineers state that the port was not available for large steamers owing "to the shallowness of the entrance, which is encumbered by a dangerous and shifting bar, practically limiting the draught of vessels *at high water to* 12 *or* 13 *feet.* It is, therefore, impossible for the steamers from Europe to enter the harbour and, consequently, all goods have to be conveyed over the bar in branch steamers (the largest carrying about 1,000 tons), from which the goods are either transhipped at Forcados River or, in quiet weather, are put on the larger steamers lying in the roads by surf boats."‡

In respect to transhipment it is well to note that, at present, the bulk of the trade from and to Lagos is dealt with at Forcados. The water on the Lagos bar has also materially altered since the above estimate and varies from 9 feet 6 inches to 12 feet, and is actually to-day about 9 feet 9 inches.

The bar itself is, as noted, a continually changing one. "Constant changes are going on at the bar, a few days of bad weather completely altering the soundings there."‡ To effect an improvement the Consulting Engineers proposed the construction of two training banks and moles extending out to deep water at an estimated cost of £830,000. By this expenditure it was thought that a depth of from 21 to 23 feet of water would be maintained on the bar. No provision was, however, made for the improvement of the inner harbour itself, which was, and is, of very limited extent for deep draught vessels, and is totally unprovided with suitable wharfage.

The Consulting Engineers entertained no doubt that works on the line proposed, if suitably executed, would effect the object desired of granting access to deep draught vessels up to, say, 19 feet at low water spring tides. They were, however, equally confident that no *partial* execution of these or other works would benefit the port.

In view of the small total trade of the Colony in 1892, then standing at £1,000,000, and the vast magnitude of the works proposed "the exposure of the site and the shifting character of the banks, the difficulties of a supply of suitable stone, the character of the native labour, the unhealthiness of the climate, it would certainly appear that the improvement of the entrance at Lagos is entirely beyond the range of practical execution, at all events until the Colony has been further developed."‡

From 1892 to 1898 the proposal was kept alive by correspondence, and in 1898 formed the substance of a further and more detailed report by the Consulting Engineers. This report§ covered various new proposals, but finally adhered to the original project of 1892, reducing, however, the estimates to £800,000. It pointed out the inadequacy of the harbour itself, and further recommended the provision of a slipway for repair of vessels up to 1,200 tons at a cost of £45,000. In passing on this report, Sir M. Ommanney, for the Crown Agents, recommends the improvement of the bar and provision of a slipway at a total cost of £845,000, no mention

* I did not notice anything so bad as to warrant such a description.—E. P. C. G.
† Africa Pilot, Admiralty.
‡ Coode, Son, & Matthews, 21st April, 1892. No. 1 in [Cd. 2787].
§ Coode, Son, & Matthews, 30th June, 1898. No. 2 in [Cd. 2787].

being made of improvements necessary to the inner harbour. At the same time the Crown Agents indicate what, in their opinion, should be the future transport policy for Nigeria as a whole, as being, in their opinion, bound up in the development of this harbour. "The question is, it appears to us, one which can only be decided on broad issues connected with the further development of this part of British West Africa. It seems inevitable that when once the Lagos Railway has reached Ibádan, the opening up of the whole Niger territory and of Sokoto must be by means of the extension of that railway across the Niger. To approach that problem from any other direction, as, for instance, by means of a railway from Forcados, would be to sacrifice the enormous advantage of the heavy expenditure which will have been incurred by the time the Lagos Railway reaches Ibádan, and it seems as though the necessity of serving the rich and populous districts through which the Lagos Railway will pass has already determined the line of future railway development and the destiny of Lagos as the port at which the bulk of the trade of Nigeria will have to be dealt with. If this view be sound, there can be very little doubt as to the wisdom of commencing these works with the least possible delay and of pushing them vigorously forward."*

In 1892 Sir John Coode, having in view the trade of Lagos only, could not advise the heavy expenditure necessary for harbour improvement. By 1898 there had been a considerable increase in trade, an increase which has been maintained. Sir M. Ommanney and his colleagues now for the first time put forward the very strongest argument in favour of expenditure, in asserting the destiny of Lagos to be the port for all the Nigerian traffic, and by this presumably was meant the trade of Lagos, its hinterland, and Northern Nigeria. When this theory was advanced, little or no knowledge of Northern Nigeria was available. The country was in nominal possession of the Niger Company, who were confining their operations to the Niger and Benue Valleys. Nor did any accurate knowledge exist of the adaptability of the Niger navigation or its possible improvement, nor yet of the condition or suitability of the port of Forcados, which was in immediate connection with the Niger. Throughout all the discussions, despatches, and reports, upon the transport problems of Nigeria, extending over 16 years, the gravest ignorance is displayed of the possibilities of Niger navigation and of the port of Forcados, no reports of any detailed or reliable nature having been made or even suggested. The view of the Crown Agents that Lagos was destined to be the future port of our vast Nigerian territories was thus made on somewhat partial information, but it is a view which has prevailed in certain circles down to the present day. Intrinsically of undoubted value, the method of its assertion has confused the consideration on its own merits of the whole Nigerian transport question.

In March, 1900, the report of the Consulting Engineers was forwarded to Sir F. Lugard, the High Commissioner for Northern Nigeria, and to Sir R. Moor, High Commissioner for Southern Nigeria, by Mr. Chamberlain, who thought the question of such a large expenditure on the port of Lagos was one for consideration in connexion with the question of the development of Nigeria as a whole. Sir F. Lugard, in reply (May 11, 1900), appears to have accepted the view that the destiny of Lagos as a general outlet was definitely decided and does not offer any opposition to the proposals. Sir R. Moor would appear to have taken a somewhat local view in recommending Calabar both as being the best port and best starting point for a railway to the interior. Sir W. MacGregor, then Governor of Lagos, adhered to the view that Lagos was the natural outlet for all Nigeria, and advocated the improvement of the port and the extension of the Lagos Railway to Ilorin, Kano, and some day to the Nile.†

In the meanwhile the Consulting Engineers for West African Railways, Messrs. Shelford and Son, had been requested to draw up a general scheme for railway extensions in Lagos and Southern and Northern Nigeria. This report, presented almost at the same time (July 5th, 1900),‡ unhesitatingly condemned Lagos as a general outlet and confined its sphere of action to the country south and west of the Niger. Here again, though the various ports were in a measure considered, no thought or attention was directed to the Niger navigation, Forcados as an entrance with Warri as a railway terminus being the proposal for Northern Nigeria. The scheme thus actually involved a railway parallel to the Niger, a river then charted and navigated by a considerable shallow-draught marine.

* Sir M. F. Ommanney, 25th July, 1898. No. 3 in [Cd. 2787].
† 9th August, 1900. No. 7 in [Cd. 2787]. ‡ Enclosure 3 in No. 6 in [Cd. 2787].

By December, 1900, the Consulting Engineers,* after consideration of the views of the various Governors, considerably modified their previous opinions, though they by no means committed themselves to the Lagos route.

By 1902 the whole policy had further developed by the opinion expressed by Sir R. Moor and Sir F. Lugard and concurred in by the Consulting Engineers that Northern Nigeria was such a vast territory that more than one line was required, and all favoured a second line from Calabar. Still no mention is made of the Niger.

In 1903 Sir F. Lugard strongly, and apparently for the first time, advocates a surface railway from the furthest navigable point on the Niger and the use of that river and Forcados Port as an outlet for all Northern Nigerian trade, at the same time advising the abandonment of the idea that Lagos could become the port of Northern Nigeria. Gaining his point in a measure, surveys for railways in Northern Nigeria depending on a river base and leading to Kano were made in 1904. Then ensued a long dispute as to estimated cost of railways as between the Consulting Engineers and Sir F. Lugard which extended down to 1907.

Throughout these 15 years no reports were sought as to Niger navigation, and the assertion that Lagos had the destiny of a general port, put forward by Sir M. Ommanney in 1898, seemed to hold strong ground. In 1907 the general transport policy is still under consideration; but it is my earnest hope that this report, and more particularly the views expressed as to Niger navigation, may afford sufficient information to justify a conclusion.

Notwithstanding the lack of a final decision on the general policy, within the last few months a start has been authorised on Lagos Harbour Works. For this reason I have briefly detailed its past history and that of the railway question with which it is inextricably mixed. Sir John Coode was distinctly of opinion that no partial work on Lagos Harbour would effect any good. Therefore the Colony is now apparently committed to the policy of expending some £850,000 on Lagos harbour, bar, and slipway. The sum necessary for the port itself will undoubtedly augment this expenditure. Furthermore the draught of steamers must increase, and, if Lagos is to be a port of call in the future, it must eventually have about 24 feet of water, not 19 as proposed in the Consulting Engineers' estimates.

The actual expenditure approved is £200,000 and the total involved is justified by the estimate that a saving of £60,000 per annum will ensue on completion of the works, a sum equal to 4 per cent. interest and sinking fund on £1,500,000. This expenditure may in the future form part of a general debt for which North and South may be jointly responsible. It would appear wiser to have decided upon it with a settlement of the general transport policy.

(2) *The Niger Ports.*

The Niger ports are formed by the many debouchures of the river. From west to east they are 17 in number, viz.:—

River.	Water on Bar.	
	ft. in.	
Benin (Sapele)	13 0	
Escravos (Warri)	11 0	not used.
Forcados	19 6	
Ramos	14 0	not used.
Dodo	8 0	not used.
Pennington	10 0	
Middleton	19 0	
Nun	13 6	
Brass	16 0	

* 6th December, 1900. Enclosure in No. 9 in [Cd. 2787].

River.	Water on Bar.	
	ft. in.	
St. Nicholas	7 0	not used.
St. Barbara	—	not used.
St. Bartholomew	—	not used.
Sombrero	15 0	not used.
New Calabar	13 0	not used.
Bonny	22 0	
Antonio	—	not used.
Opobo	13 9	

Of these the *Forcados River* alone gives a good waterway to the Niger; and furthermore, owing to the difficulties of negotiating the bars at the Benin and Escravos, it forms the port of entrance for reaching Warri and Sappeli, two important sea ports in the western part of old Southern Nigeria. The remainder of the ports from Ramos to Opobo do not give a good approach to the Niger navigation. They are, where suitable, used as ports of call for the trade with the dense delta population of New Calabar, and will not be further described.

Port of Forcados and Forcados River.

"This river, the best and most accessible route to the Niger and also to the Benin, has an entrance two miles in width. The shores of the lower course of the Forcados River are sandy and almost free from marsh and mangrove and both banks are of moderate height, densely wooded and bordered by a sandy beach. Ten miles within the entrance it bifurcates; the southern arm (which connects with the Niger) retaining the name of Forcados, whilst the northern arm (which connects with Warri) is known as the Warri River. The entrance is obstructed by a bar, but as the channel across carries 17 *to* 18 *feet at high water*, and is of considerable width ($\frac{1}{2}$ mile), Forcados River may be considered the most accessible estuary of any on this part of the coast, with smooth water 5 fathoms deep immediately inside the bar. The rise of the tide is 5 feet on the bar.

"*Tidal streams and Tides.*—The flood stream runs 3 hours at the rate of 2 knots an hour; the ebb 9 hours at 3 knots, propelling the *discoloured water* 13 *miles seaward.** Within the river the rise of the tide is about $4\frac{1}{4}$ to $4\frac{1}{2}$ feet."†

From Forcados large ocean-going vessels can be navigated in inland waters to Sappeli (86 miles) and to Warri (40 miles), both important Southern Nigeria trade centres. The third and most important function of the Forcados River is that it forms the main navigable outlet of the Niger River, which it joins at Samabri, 105 miles above Forcados. For some 15 miles of this distance, namely, Bar to Goshawk Point, there is 30 feet of water, and thence for 30 miles to Ganagana the least water is 9 feet; above Ganagana to its junction with the Niger itself the stream has from 7 to 20 feet according to the season.

There would appear to be little doubt that the entrance to the Forcados River from the sea could be improved without difficulty and at small expense. The bar shifts but little laterally and has maintained a fairly even depth for many years. Inside the bar there exists a vast ready-made harbour embracing an area of 3 to 4 square miles, or, say, 2,000 acres, having a depth of 30 feet at low-water spring tides—good firm ground is available for wharfage, though most of the work here is of a tranship nature. Messrs. Elder, Dempster have established large workshops and a floating dock capable of handling ocean-going vessels. The Niger Company and the Nigerian Governments possess wharves, depôts, slipways, and engineering shops.

Forcados is and always will be a tranship port in so far as its use for Niger River work is concerned, a matter for distinct congratulation, as it allows of the formation of trade bases and depôts at more healthy points on the river above the purely tropical and unhealthy coast belt.

* At Lagos the estimate is 3 miles, an indication of the comparative volume of flood water.
† Africa Pilot. Admiralty.

(3) *The Calabar Ports.*

These ports serve that portion of Southern Nigeria lying to the east of the Niger delta. The main port is that of Calabar—probably one of the best on the coast and giving 21 feet of water on the bar. The Cross River runs into this port and affords communication with a great portion of the interior. There is, however, no practicable communication with the Niger.

II.—Existing Transport of Nigeria.

(1) *Southern Nigeria.*

The sea serves the whole coast line of Southern Nigeria.

In the east, internal communication is maintained by the system of rivers forming the Niger delta, the Cross River, and its affluents—in which the Government operate a service of steamers. Along the Niger, since May, 1907, the Southern Nigeria Government service has been amalgamated with that of Northern Nigeria. In the west the Colony of Lagos and its hinterland has been opened up by means of the Lagos Government Railway. Considerable development by means of road construction has also been carried on. I am not sufficiently conversant with the progress of this policy to offer any remarks as to its present or ultimate success, though it would appear from much experience in the southern provinces of Northern Nigeria that any dependence upon animal and wheeled transport on roads will not be highly successful, owing to the ravages of the tsetse fly and epidemic cattle or animal diseases.

The Lagos Government Railway is at present the main transport route by land of Southern Nigeria, and, as previously mentioned, it is thought that, combined with the port of Lagos, it might be suitable as a general transport route for Northern as well as the south-western portion of Nigeria.

The Lagos Government Railway.

The Lagos Railway serves the south-western portion of Nigeria mainly in the old Colony of Lagos; and by the end of 1905 it had been completed from Lagos to Ibadan (125.5 miles) at a cost of about £1,000,000, or £7,860 per mile. It is a 3 ft. 6 in. gauge of a fairly high standard, and well equipped with station buildings and rolling-stock.

The financial result of working for 1905 was that on "the total capital applied for railway purposes proper"*—a return of about 1½ per cent. was made. This was calculated by net earnings of £15,874. The working expenses of the line were approximately 78 per cent. of the gross receipts, £56,775 in £72,649. In the gross receipts are included—it is not stated at what profit—£14,000 of Government traffic, of which £4,000 was for railway extension work to Oshogbo. The total tonnage of public goods carried was 34,000.

With such heavy capital expenditure, high working costs, and small volume of traffic, must be associated high rates. Thus cotton is carried from Ibádan to Lagos at the somewhat severe rate of 4¼ pence per ton per mile, the average rate charged per ton per mile on the Lagos Railway working out in 1905 at 3d., and the actual cost at nearly 2½d.

100 tons of general goods are carried (at owner's risk) a mile at a minimum rate of about 25s.; an average rate of about 40s., and a maximum rate of about 80s.

Compare with other tropical countries:—

Country.	Rate.		Gauge.
		s. d.	
India	per 100 tons per mile	3 11	Various gauges.
			ft. in.
Sudan	„ „	8 4	3 6 gauge.
Algiers and Tunis	„ „	10 0	4 8½ „
Japan	„ „	11 0	3 6 „
Dutch East Indies	„ „	11 0	3 6 „
Brazil (two companies)	„ „	15 0	3 3 „
Lagos	„ „	40 0	3 6 „

* Report Southern Nigeria (Lagos), 1905. Term not clearly understood.—E. P. C. G.

The traffic possibilities and prospects are regarded as sufficiently hopeful. There is reason to think that the conditions of railway transit will soon be more fully appreciated by the rural population.*

With the prevailing high rates it appears to me somewhat doubtful whether much expansion of native traffic will be witnessed.

The report of 1905 goes on to say, that, "the freight and passenger rates have been fixed *at rates that are unremunerative on the present volume of traffic*, and much lower than is customary on West African lines, which have proved exceptionally costly to construct, and require a highly-paid European staff, one-third in excess of requirements, in order to provide for the frequent absences on leave necessary to Europeans in this climate. The Government, while anxious to see the railway paying maintenance, interest, and sinking-fund charges, is unwilling to increase the rates to accelerate the attainment of this desirable result."*

Granted that working expenses will always be excessive, and legitimately so, the foregoing figures would appear to emphasize the fact that the railway standard adopted was far higher than the country required for some years to come. Since the above report was written, the line has been almost completed a further 60 miles to Oshogbo at an estimated cost of £6,500 a mile, and a further extension of 60 miles to Ilorin in Northern Nigeria approved. The ultimate destination of the line is as yet undetermined, though it is thought by some authorities that the Lagos Railway should go on by Jebba to Zungeru and Kano.

The extension to Oshogbo is now quoting rates on cotton of 3½ pence per ton per mile. When Ilorin is reached, the rate may come down to three-pence, and, if eventually the line were taken to Jebba and Zungeru, the rate from Zungeru to Lagos might be as low as three-pence, though this is doubtful. If on the present line through the rich hinterland of Lagos and the Nigerian province of Ilorin, which gives much way traffic, the rates are unremunerative, how can a line from Ilorin to Zungeru, through a devastated, sparsely populated, and comparatively sterile country, afford even the present rates? The rate from Zungeru to Lagos on cotton at 3d. per ton per mile would be approximately £5 per ton.

I cannot help thinking that the Lagos Railway would best assist the interests of Southern Nigeria and our own by throwing a line from a point near Oshogbo to a point opposite the base which may be chosen for Northern Nigeria on the Niger. This point should, I think, be Baro. Sir W. Egerton in discussing this matter urged that I should do all in my power to secure a railway base somewhat north of Baro in order to ensure an almost direct line as between Oshogbo and Kano (see map). To meet his views I personally examined the river between Baro and Shonga and could find no suitable point for a railway base, as the Niger floods the banks at high water at every point above Baro. By reference to the map, it will, I think, be apparent that my proposal gives a very direct line to Kano as from Lagos, though a crossing at Mureji would, had it been practicable, have been even more direct.

(2) *Northern Nigeria.*

Northern Nigeria at present depends upon two systems of transport:—

(*a*) Marine;
(*b*) Land.

(*a*) *Marine.*

Water transport is possible through a great portion of Northern and Southern Nigeria by means of the Niger River and its affluents, a large marine flotilla, both Government and privately owned, being occupied in the carrying trade along these waters.

The Government of Northern Nigeria since May, 1907, maintains the only Government service on the river; steamers with an aggregate tonnage of 665 tons,† and lighters with a carrying capacity of 250 tons, being employed. The Niger Company have a considerable flotilla of river steamers, some 15 in number; varying in tonnage from the "Scarbrough," of 468 tons, the largest boat on the Niger, to the "Egga," of 10 tons, and aggregating some 2,630 tons. Messrs. Holt and Company and Messrs. Pagenstecher account for another 400 to 500 tons. In all, the aggregate tonnage of the river flotilla is about 4,000 tons.

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* Report, Southern Nigeria (Lagos), 1905 (see p. 45 of Colonial Report No. 507.

† Includes "Valiant," 180 tons.

In addition, at high water ocean steamers are frequently brought up the Niger as far as Lokoja and Baro. In 1905 steamers of 1,900 and 2,250 tons respectively were so chartered.

The larger steamers of the Niger Company can only work on the high and medium flood from July to about January, and are then laid up for the season. The rates of carriage prevailing are high, but even to-day compare very favourably with rail rates in West Africa. The Niger Company devotes itself almost exclusively to developing riverain traffic, and, except for its venture in mining for tin, is rarely if ever found trading 50 miles from the navigable rivers. The Government alone among Europeans is forced, in the general administration of the country, to establish long lines of land transport—certain proof that in the present condition of land transport little or no development of the internal States will be witnessed.

Should the rich interior be granted proper facilities to reach the Niger, I have no doubt whatever, as expressed in my remarks (later) on Niger navigation, that the flotilla will be vastly increased as found necessary, and be in a position to carry traffic at very low rates.

(*b*) *Land Transport.*

Neglecting as a factor the existing small steam tramway between Zungeru and Barijuko (22 miles), existing land transport in Northern Nigeria insensibly divides itself for organisation into:—

(1) Provinces where animals may be used;
(2) Provinces where animals cannot be used.

Broadly speaking, animals cannot be used with any economy in all the southern provinces of Northern Nigeria along the Benue and Niger Rivers. The northern provinces of Sokoto, Zaria (in part), Bauchi (in part), Kano, and Bornu, alone permit of the use of animal transport if any regard to economy is desired. It will thus be seen that the northern provinces are forced in carriage to pierce the belt of country lying between them and the Niger either with heavy loss in animals or by the use of the most expensive form of carriage in existence, human head transport. There is also a limited quantity of this human freight available, and in the past the administration has frequently been obliged to resort to orders for such transport. Though the remuneration invariably paid was and is high, much above the current rate of wages in the country, increasing difficulty in obtaining head transport has been felt. To obviate this, my predecessor established at considerable expense a cart road between Zungeru and Zaria, thus piercing the dangerous belt. An efficient transport was organised with the assistance of imported Punjabis and Indian carts. The result has been a diminution in the demand for head transport or carriers. Otherwise the service has been slightly more costly than carriers, the loss in animals having year after year amounted to no less than 50 per cent. of those employed on the road.

It is an undoubted fact that in addition to our own demands many thousands, probably twenty to thirty, of native carriers work caravans on their own account through the Hausa States and even to Lagos. This service has been maintained for many years. The native, valuing his own day's work at a low figure and carrying only the richest products, such as potash, or kola nuts, salt, cotton goods, and matches, remains months on the road, thus further diminishing the popuation employed in reproductive occupations. Any efficient line of communication between the Hausa states and the Niger would tend to put an end to this human carrier trade—a most desirable object.

Examining the cost of this transport through the danger belt, is it surprising that (1) administrative expenditure is high; (2) a strong military force is necessary; (3) no commercial development can take place?

All administrative, military, and commercial convoys in the Protectorate travel in ordinary times at the rate of 15 miles per diem (a high average) or *three-quarters of a mile per hour*. At this rate move European officials whose emoluments in almost every case amount to at least £1 per diem. At this rate move the military reliefs. At this rate, it may be said, the country moves.

To move an official costs us, in addition to his pay, 10s. per diem. One such minor official proceeding from Zungeru to Bornu costs at least £25, or the rate from Liverpool to Southern Nigeria. In addition every ton of Government goods or of European merchants' goods costs £42 as between the capital Zungeru and Kano, or a rate of nearly 7s. per ton per mile. The transport vote, mainly devoted

to the requirements of the white official element, costs about £100 per annum for each official in the country.

In the face of such an *impasse* in transport, the country's material progress must be slow; its commercial development throttled; its expenditure from Imperial funds perennial.

On many occasions my predecessor has advanced similar arguments, and I am glad to be enabled to support him in every one of them, except the desire for alleviation by means of a light tram. A normal gauge West African railway on pioneer lines will be the only solution of the economical development of the country.

III.—The Niger Navigation.

(1) *Existing Conditions (See maps).**

No report upon this important subject based upon accurate soundings has ever been rendered in the past, nor any technical examination carried out with a view to determine whether the navigation at low water could be quickly or economically improved by dredging or other methods commonly adopted in similar navigable rivers elsewhere. The mere fact that this magnificent waterway was found to have for two months in the year a few shallows carrying two to three feet of water appears to have been considered sufficient evidence to condemn a transport route of the very highest value to Nigeria as a whole.

The Niger proper begins at Samabri, the confluence of the delta branches to Forcados and Akassa. From this point the river is unimpeded by any rapids or falls to Jebba, a distance of nearly 500 miles, and in a similar way its main affluent, the Benue, to Yola, a distance of 400 miles—nearly 1,000 miles in all of free navigation from the sea into the heart of Nigeria and almost to the borders of the great provinces of Zaria, Kano, Sokoto (the Hausa States), and Bornu.

I do not propose to further consider the Benue, as the views which will be detailed with regard to the Niger are equally applicable to the former and might when necessary be applied to its improvement.

The Niger River runs almost due north and south from Baro (a point much under discussion as the river base of a railway) to Samabri, a distance by channel of some 300 miles. Throughout its course it is remarkably free from rocks, has nothing approaching rapid water, and, with a width varying, even at lowest water, from one to three miles, propels at some three to six miles an hour an immense volume of water. Its banks are of medium height at low water, covered with magnificent trees and inhabited by a very large population, more particularly in Southern Nigeria.

From Lokoja towards the coast the river is lowest in May, between Lokoja and Baro in June—the date of lowest and highest as between years varying only a few weeks.

Broadly speaking, the Niger, in its existing unimproved condition, affords navigation to Baro for steamers drawing from 4 to 6 feet in July, 6 to 12 feet in August, 12 feet in September, 12 to 6 feet in October, and about 5 feet from November to April. In May and part of June below Lokoja some of the shallows are down to three feet. In June and July above Lokoja 2 feet shallows are sometimes found.

The data given are from observations made in past years by the Nigerian Marine, but are not based on surveys or continuous soundings. No information was available as to the length or dimensions of the sand bars which thus shallowed the river at low water, and it now appears as if their extent in the past has been grossly exaggerated. No attempts, moreover, had been made to buoy the channels or in any way to improve low-water navigation.

In considering in England the general transport policy of Nigeria, I had been struck by the want of information available about the Niger, and determined on my arrival in West Africa to ascertain the conditions prevailing in so far as possible.

To effect this, Admiralty charts covering the whole river were available, unfortunately of somewhat ancient date. Though useless as to channel, owing to changes in the river soundings, they were still of great use as a basis for survey, the river banks not having changed materially in many years.

Mr. Shelford, one of the Consulting Engineers for West African railways, accompanied me in my inspection of the Niger as far as Lokoja. At the mouth

* Not reproduced.

of the river (Burutu) I transferred to the Northern Nigeria steamer "Corona," and was joined by Mr. Wallace, Deputy High Commissioner, who has an intimate knowledge of the river extending over 20 years, Mr. Elliott, the Marine Superintendent, and Mr. Ridsdale, Acting Director of Public Works. From Burutu, we proceeded up the Niger on April 5th, or about one month before dead low water, and were thus enabled to see it in almost its worst condition. My instructions to Mr. Shelford and the Marine Superintendent were to sound every existing bar between the sea and Baro, allow for the further drop to low water, and report to me the mileage of the channel which would have to be dredged to secure six feet of water all the year round from Burutu to Lokoja. It was not without misgivings that I began this work. The total distance in the channel from Burutu to Lokoja is 350 miles, and it was estimated by some officials of Nigerian experience that we might find that at least 20 per cent., or 70 miles of channel, would have to be dredged to produce this result. The steamer ran by day only to give every opportunity for an accurate report by Mr. Shelford, the Marine Superintendent personally directing the sounding. The result given me by Mr. Shelford on arrival at Lokoja was a complete surprise to many; for it was found that of the distance of 350 miles *only two per cent., or seven miles, would have to be dredged to maintain a six-foot channel all the year round.* This fact, in my opinion, renders nugatory any transport policy for the northern portion of Nigeria based upon railways from the sea. A six-foot channel would permit of vessels of 900 tons gross burden reaching the mouth of the Benue at Lokoja, all the year round.

Mr. Shelford returned to England from Lokoja with copious notes, and, as I have previously recommended, will furnish a report upon the river with, I trust, the collaboration of Sir Benjamin Baker. I beg to request that any such report if rendered may form an enclosure to this general one.*

Mr. Elliott, the Marine Superintendent of Northern Nigeria, continued the observations and soundings from Lokoja to Baro, with the result that it is now established beyond doubt that to maintain a six-foot channel in the river from *the sea to Baro* will be both practicable and economical by dredging in low water between February and July. If in addition to the provision of one river dredger, which apparently would effect the above, works were undertaken of an economical and simple character to regularise the flow of the river, the amount of annual dredging might possibly be considerably reduced.†

(2) *Competitive Land and Water Transport.*

From American and Canadian experience can be obtained much valuable and comparative information of competitive land and water transport. Here great waterways thousands of miles in length work side by side with railway lines.

In the north the great lakes, combined with the canalised St. Lawrence viâ Canada, and the Erie Canal viâ the Hudson River, form the greatest waterway in America.

In the south the Mississippi River, with its principal affluents, the Ohio, Missouri, and Arkansas, forms a second great natural waterway, closely resembling in its working conditions the navigable Niger.

The St. Lawrence and Erie routes are in direct competition with railways. The canalised portions naturally prejudice their use as rapid means of communication and both routes are closed by ice for six months in the year. Notwithstanding these disadvantages a huge tonnage of raw products is handled at a very low cost. On the canalised portion the rate is as low as one farthing per ton per mile: in the natural portions even lower rates prevail. Water transport through canalised waterways, owing to slowness of transit, is competing less and less with rail. In the Erie Canal, some 350 miles long, the average time of transit for a steamer working one consort barge and carrying a total load of 450 tons is about 11 days, or a speed of only 1½ miles an hour. Though the carrying rate is very low, less than one farthing per ton per mile, the tonnage carried has not increased in proportion to that of the competing railways. The pace is too slow for anything but the roughest goods. The railways by thorough organisation for the handling of through goods traffic, in train loads attaining a tonnage of from 2,000 to even 3,000 tons, have been in a position to quote rates as low or even lower than offered by the canals.

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* See enclosure in No. 31.

† In Appendix II. will be found a valuable report by Marine Superintendent upon Niger Navigation.

It is to the Mississippi and its affluents that we must look for conditions closely approaching those which might obtain on the River Niger.

In both, open navigation exists all the year round; on the Mississippi and its affluents for 15,000 miles; on the Niger to Jebba, and in its main affluent, the Benue, to Yola, 500 and 400 miles, respectively.

Both the American and African rivers have many common characteristics. A rapid rise and fall of the river at certain seasons whereby for some months very little, if any, water is left in the channels, which are impeded by the formation of sand bars or banks. The African river maintains a higher level for a longer period than the American; and the latter has an added difficulty to contend with in the shape of much drift wood or snags, necessitating the employment of special snag-destroying steamers to maintain a free channel. The absence of rocky obstructions is a feature of both.

The condition of navigation on the Mississippi in 1890 closely resembled that of the Niger to-day:—

> "Carriers on the Mississippi have never been able to adjust the character of their craft to the demands of cheap carriage because the great fluctuations in the stage of water in a single season have not permitted it. On the ocean and the lakes the largest vessels are the cheapest carriers; but on the Mississippi a large boat that loads to 8 or 9 feet in high water cannot carry a third of a cargo on a 4 or 5-foot stage, and a light-draft boat that runs on a 5-foot stage is not profitable in high water. Carrying rates, as a rule, go up and down inversely as the water goes up or down, and yet experienced vessel owners assert that there is no profit in low water carrying at any rate, the half cargoes, the delays, and the risks generally consuming all the receipts, and frequently resulting in losses.
>
> "With a good river, they carry grain from St. Louis to New Orleans, a distance 1,242 miles, for 11 cents per 100, or $2.20 a ton, or less than 2½ mils per ton per mile—the average railroad rate for the whole country being about 9½ mils per ton per mile. And yet, low as this is, they assert that they can reduce it still lower with an abundant supply of freight and with a permanent good stage that would permit them to build boats suited to the conditions.
>
> "It is a striking fact that a great portion of the 29,505,046 tons of the river traffic in the Mississippi Valley was carried on 3 to 5 feet of water. It is a very reasonable conclusion, and which has been very satisfactorily demonstrated in the history of the improvements of the channels of the great lakes, that could a safe and proper channel be insured all the year round in the Mississippi and its main tributaries by the removal of the present impediments to traffic,* the commerce of the western rivers would not only be greatly increased, but at the same time very materially cheapened and rendered more rapid and satisfactory."†

The American river has been improved by dredging and regulating in such a manner as to provide in the more important sections a 9-foot channel 250 feet wide all the year round. Nothing whatever has been done to improve conditions in the Niger.

The tonnage per annum now carried on the improved Mississippi amounts to some 40,000,000, handled mainly by tow boats and barges. The organisation is very complete for handling bulk goods. An example will show the magnitude of even individual business. One Corporation alone on the Ohio, the Monongahela Coal and Coke Company, has 100 tow boats and 3,000 barges transporting 4,000,000 tons per annum between Pittsburg and New Orleans, a distance of some thousands of miles. These barges, made up into rafts varying in size according to the navigation, attain in the Mississippi down stream work colossal dimensions, 30,000 to 40,000 tons being handled by one or more tow boats. The cost per ton per mile is a mere fraction of a farthing.

The Mississippi navigation thus acts as a potent factor in determining the cost of United States grain and cotton in England. Though turning at St. Louis a right angle to the direct route to Europe it carries a large bulk of export corn and cotton.

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* Sand bars and snags.

† Report on Internal Commerce of the United States, 1891, Treasury Department, Washington, 1892.

Had the Mississippi run direct from St. Louis to New York it would have been an even more formidable determining factor in the export price of raw materials and foodstuffs of the United States and the corresponding price of food in Europe. Limiting as it does the monopoly of rail carriage, it may be truly said, in the words of an American statesman, that the "Mississippi River would ever prove the key to the safety of the nation; the control of the one ensuring the control of the other."

The Niger navigation presents many more favourable features than the great American waterway. With proper buoying the distance from Lokoja to Burutu can be run in from 24 to 36 hours or at a rate of 10 to 12 miles an hour, a pace quite equal to that of the average through goods train in Africa. It pierces the unhealthy coast belt and converts the natural port of Northern Nigeria (Forcados) from a port of entry and discharge like Lagos to a port of call and transhipment, thus allowing of the establishment of merchants' businesses at Lokoja or Baro under much better conditions as to climate or surroundings than can ever exist at a coast port.

Under such circumstances it does not appear to me that any railway could compete with the Niger as between Baro and the sea, whatever direction it take or whatever port it used.

Passengers, mails, fast perishable goods, will probably go by Lagos, and in times of great production that port might even take any surplus. I doubt, however, the river failing to carry the bulk of the export trade of the hinterland of Nigeria.

The capital expenditure on the river will be small, that on the railways from the coast has been and will be very large and, consequently, the rates proportionate. To-day Niger rates are lower than rail, and the future must tend to a reduction of those rates to that of water-borne river traffic elsewhere, the conditions for such reductions being as favourable as those to be found upon any river in the world.

(3) *Dredging and Regularisation.*

(a) *Dredging.*

The method adopted, after considerable experimental work, for improving low-water navigation on the Mississippi River, was by means of hydraulic dredges of large capacity, which would open a channel through a bar within a short time sufficiently wide and deep to accommodate navigation and, to a considerable extent, to direct the flowing of the current along the line of least resistance. The width of this channel is usually 250 and its depth 9 feet. The Commission having the matter in charge has reported that the plan has met with such success as to justify the continuance of dredging. They claim that it has proved to be "a successful, economical, and reliable, means of low-water channel improvement."

The report of the Mississippi River Commission for 1900 showed that during the season of 1899 five dredgers were employed. They cut about 62 miles of bar channel, averaging 105 lineal feet per hour. The channels were maintained without difficulty, the season being very favourable.

Cutting of Bar Channels.—In this work much depends on the skill with which the location of the channel is made by the dredger and also upon the water conditions. When the water remains stationary or steadily falls (the Niger practically meets these conditions from December to June), a channel once opened remains navigable as long as there is low water. If the location is along lines that the current, in seeking a crossing, will readily follow, it will not only remain open, but will steadily improve. No established rule can be laid down, however, for the location of this channel, it being necessary to make a study of each case as it comes up and then so to place the dredger that it will do the work effectively. The plan pursued in recent years has been to rapidly survey, some time before extreme low water, the places most liable to require deepening. A second survey is made at the time it is desired to begin operations. A study is then made of the results of the surveys, followed by further examinations and observation, and a decision is reached as to where the cut should be undertaken. Sometimes it becomes necessary to abandon a cut after it is started, because the conditions prove unfavourable to its maintenance, while in some of the channels excavated it is necessary to remove additional material from time to time.

Operation.—To operate one of these dredgers two wrought-iron anchor piles are sunk by water-jet about 25 feet apart, and about 1,000 feet above the point where the dredging is to begin. Wire cables are run to them from the dredger, which then

commences pumping, and slowly winding in the cables by steam drums, the rate being of course commensurate with the capacity of the pumps, an average being between 60 feet and 80 feet per hour. The excavated material is deposited through discharge pipes many hundred feet away.

In busy seasons the dredgers are run 24 hours per day, and the cost per cubic yard is given as from four-fifths of a cent to 15 cents, depending on the looseness and quantity of the material. The cost of the dredger is from £18,000 to £22,000 according to size.

Dimensions of Dredger.—The dredger "Iota," which is one of the most recent of the Mississippi River fleet, has a hull of steel, 44 feet by 192 feet and is self-propelling, being provided with a pair of side paddle-wheels 21 feet in diameter. The draught was designed to be 48 inches. The boilers are seven in number, set in three batteries, and with a working pressure of 170 pounds. The pumping outfit consists of a centrifugal pump with a 32-inch discharge, capable of delivering not less than 1,000 cubic yards of sand per hour through 1,000 feet of pipe.

Full quarters were constructed on the hull, including laundry, bath-room, machine shop, and refrigerating and electric-light plants.

The foregoing description has been obtained from the reports of the Commission and technical works on the subject and amply demonstrates the efficiency and economy of working river dredgers. If five of these river dredgers keep open 62 miles of 9-foot bar channels 250 feet wide on the Mississippi, is it too much to hope that one or at the very most two would keep open 9 miles of 6-foot channel 150 feet wide on the Niger, which is the estimated maximum obstruction?

(b) *Regularisation.*

In addition to dredging, which in itself promises to convert the Niger navigation to a higher efficiency when necessary, there is the consideration of what should be done in the regularisation of the river in order to ensure that the advantages of dredging may not become an annual charge. To meet these requirements I beg to recommend the engagement of a qualified engineer, versed in river improvement, who, with our Marine Superintendent, should visit the Mississippi this low water, viz., August, September, October, coming on to the Niger at the beginning of our low water in December.

In the event of such an official being appointed one important matter would at once engage his attention here, one which is, moreover, of great consequence to Southern as well as Northern Nigeria. There is every indication that by the lapse of a certain cycle of years the Niger at its bifurcation, now throwing a large bulk of its waters into the Forcados branch, may revert to the Akassa branch for its main discharge. Such an event might impede the existing navigation in the Forcados River and seriously prejudice the port of that name on which both Governments of Nigeria and the shipping and mercantile community have spent very considerable sums. Had any report on the Niger ever been demanded in the past the condition of affairs at the bifurcation would have been disclosed and early steps taken to prevent the danger described. It would not appear that effective measures cannot now be adopted or that they will cost more than a nominal sum, (the presence of a dredger would undoubtedly quicken the works which may have to be undertaken), and as Mr. Shelford in his report has promised to go fully into this particular problem I will not further discuss it.

I do not feel qualified to indicate the lines along which regularisation of the Niger should be undertaken—on this subject expert advice should be taken. Dredging alone will maintain whatever depth we may require, and even dredging on a large scale is not warranted in the present condition of the export and import trade of the country. Regularisation will assist in retaining more or less permanently the results of such dredging, any expenditure being spread over a period of years and be entirely subordinated to the financial condition of that portion of Nigeria which the river navigation would serve.

IV.—The Export Trade of Nigeria.

(1) *Southern Nigeria.*

Southern Nigeria, embracing the old Oil Rivers and Lagos, has been an exporter to Europe for over a century, its main staple having been palm oil and palm kernels.

The export trade has shown a fairly steady general increase in the past ten years. In value £443,000 in 1896, it had almost reached £800,000 by 1906. The principal items being:—

Palm oil and kernels	£670,000
Corn	32,000
Cotton and seed	19,000
Mahogany	11,000
Cocoa	11,000
Shea butter	5,000
	£748,000

Railway construction has largely affected the expansion in the export trade, more particularly in palm oil, cotton, and corn, the cotton which re-started *de novo* in 1894 promising an export of 20,000 bales in 1907. The Colony has mainly depended in the past for its export trade upon the purely tropical products of palm oil and mahogany. Though by no means fully developed, these industries will be limited to the tropical coast belt; cotton, which has been re-developed in such a promising manner, being mainly obtainable from the higher lands towards the Niger and not forming a product of the coast belt. It is a regrettable fact that almost half the revenue of the country is derived from the import duty on spirits, mainly gin. In Northern Nigeria importation of spirits is prohibited, a factor which tends to lower the revenue considerably.

(2) *Northern Nigeria.*

Trade in Northern Nigeria is at present—owing to the prohibitive cost of land transport—mainly confined to the products of the valleys of the Niger and Benue rivers. The rich uplands of the provinces of Zaria, Kano, Bauchi, and Bornu, embracing some 110,000 square miles of territory, are thus practically undeveloped, except for local requirements. Supporting a population variously estimated at from 4,500,000 to 5,000,000, largely devoted to agriculture, no British dependency gives better promise for the future. Thanks to the indefatigable efforts of my predecessor and his staff, these great provinces have not only been won for the Empire with little loss of blood or treasure, but efficient organisation following conquest has given them within five years stable and what appears to be both economical and efficient local government. The staff administering this great extent of territory is a very limited one; the maximum present in the Protectorate in 1905 having been 300, the population governed numbering some 9,000,000.

The export trade has remained almost stationary for many years except in the river valleys. Three years ago its development in the inland or north-eastern provinces would have been impossible, the country not having been brought under our control and still being subject to internecine strife and all the horrors of slave-raiding and civil war. Since 1903 the country has been occupied and administration placed on such a footing that it is to-day as safe to pass through these Provinces without escort as it would be in the rural districts of Egypt or India.

Law and order, established largely through the medium of the old native administration, have effected this remarkable change, the clearest proof being in the collection of a land revenue tax based upon the existing native system of taxation and shared by the provinces and the central Government, estimated at £100,000.* Of this amount £80,000 was due from the following provinces:—Nupe, Zaria, Bauchi, Kano, and Bornu. Thus these provinces, at present unprovided with communications, contribute 80 per cent. of the land revenue, which is to-day in its infancy. Any railway line from the Niger to Kano must pass through Nupe and Zaria to the heart of Kano. It will bring a large part of Bornu within one month of the Niger, and Bauchi within ten days. The first province it would pass through would be that of Nupe. Here cultivation is widespread and the population

* This tax was established in 1904—produced for Government, 1904-05, £20,864; 1905-06, £34,063; 1906-07, £39,000 (estimated).

industrious; farms and villages would be traversed on a large mileage of the railway from Baro until the Zaria province was entered. The Hausa portion of the Zaria province has the reputation of being one of the most fertile and well-cultivated in the Protectorate. Finally, the Kano province would be entered and traversed for some 60 miles to Kano itself, for centuries past a great centre of population and trade.

From Kano eleven great main roads radiate to every quarter of the compass, and it is estimated that no less than 1,000,000 acres of land are under continuous cultivation within 30 miles of the town, the principal crops being millet, guinea corn, ground-nuts, cotton, sugar-cane, indigo, and vegetables—principally onions, tomatoes, and sweet potatoes. The culture reminds me of Egypt in almost every particular except that irrigation is not required. The fields are well tilled and kept free from weeds, and the agricultural implement used, a native hoe, is the exact counterpart of the Egyptian field hoe (fass). The villages and towns, which are almost innumerable, bear a close resemblance to the Egyptian types, the absence of lime in the country accounting for a lack of large structures or mosques. The Hausa (or Habe) is both a keen agriculturist and trader, and has fully developed theory and practice as to the rotation of crops and the value of manure for his soil, which appears to be mainly a sandy loam of great depth. Ploughs, as in Egypt of the older days, are practically unknown, and all transport is carried on by donkey, camel, horse, or head-carriage. A regular system of markets exists throughout the province of Kano as well as the adjoining ones of Katsena and Katagum which are under the same provincial government. It is well nigh impossible to estimate the acreage under cultivation in the joint provinces, which cover an area of 30,000 square miles, but it must extend to many millions. To the east of Kano lies the province of Bornu, which I have been as yet unable to visit. The largest of the Protectorate, containing a population of half a million, it is to-day almost cut off from communication with the central government, a visit to its capital only entailing a journey by land of some two and a half months.

To the south of the Hausa States is the very promising province of Bauchi, not alone from its agricultural possibilities, but in its mineral wealth. There would not appear to be the slightest doubt of the value of the Bauchi alluvial tin deposits nor of their great extent. This part of the province, moreover, stands 4,000 feet above the sea and will, with good communication, afford an opportunity of securing crops of northern cereals and legumes and offer a site for a health resort—a long-felt want for West Africa as a whole.

Between the Hausa States of Kano and Zaria and the Niger, lies the pagan Gwari country. Here again, I was greatly impressed with the possibility of export development. The inhabitants have in the past been subjected to centuries of slave-raiding, which has thinned their ranks and made them suspicious and mistrustful. They are, however, keen agriculturists and in possession of a very rich country capable of growing every tropical and semi-tropical product. Forests of valuable timber exist in the southern portion of the country, and there is every possibility of mineral discoveries as the country is contiguous to the Bauchi province.

Throughout all the provinces along which a railway to Kano would pass, a natural product—the shea nut—is to be found in immense quantities.

Broadly speaking, the possibilities of development for export in Northern Nigeria appear very promising, more so probably than in any dependency of the Crown. Cotton may prove to be the main staple and there are certainly sufficient signs of its cultivation to warrant the hope of great expansion. Doubtless shea-nuts and ground-nuts will also develop largely.

One note of warning—a visit to the Hausa States does engender optimism; the vast acreage under open cultivation, the industry of the inhabitants, the regular rainfall, all impress one in a most favourable way; what must not be lost sight of is the real paucity of population, due to conditions now happily passed away, which will without immigration take many years to rectify. There is also the combative inertia of a people satisfied to exist, and exist well, on one penny per diem, and even after the advent of railways, some years must elapse before the desire for material comfort will engender the action necessary for the purchase of any luxuries superior to food and cloth. Nevertheless, much can and will be done with these fertile states and the existing population, and I doubt if any part of our tropical

Empire has presented such clear indications of the necessity for development by means of railway communication.*

V.—Transport Policy of Nigeria.

In November, 1906, at the request of the Under-Secretary of State for the Colonies, I prepared a memorandum on this subject. After as thorough an examination as possible of the ports of Lagos and Forcados, the Lagos Government Railway and its reports, a comprehensive tour as between Baro and Kano, and full consultation with the local authorities, I see little or no reason to depart from the general conclusions then arrived at except in one respect. In England I could not consider the practicability of improving the Niger navigation as no data were available upon which to form an opinion. I am now fully persuaded that improvement both efficient and economical can be effected as required. This strengthens my view that the Niger is the best outlet for the development of the Niger and Benue valleys and the rich uplands of Northern Nigeria, but also alters the conclusion that Lokoja should at an early date become the railway centre based upon the Niger navigation. With river improvement Baro will amply fulfil this object for some years to come and can be unhesitatingly adopted as a railway base even in the present condition of navigation on the Niger. In an enclosure to this report will be found a detailed description and plans of the proposed Baro terminus (Appendix No. 1).

The first and greatest factor which determines any general transport policy for Nigeria is the presence of a great natural transport route on the Niger River which with its main branch the Benue divides the country into three sections:—

(1) the south-west;
(2) the south-east;
(3) the north and north-west.

The south-western portion is provided with the backbone of a railway system. The south-east has not begun railway construction. The north has a beginning in a 22-mile tramway connecting the nearest navigable point on the Niger waterway with the capital, Zungeru.

(1) *Roads.*

In several parts of Nigeria, both north and south, a beginning has been made in road construction. The wisdom of such a policy seems somewhat doubtful Throughout Southern Nigeria and the southern provinces of Northern Nigeria, owing to the prevalence of the tsetse fly and animal epidemic disease, animal or wheeled transport is economically impossible; the only portion of the country promising well for animal transport being the northern and north-western provinces of Northern Nigeria. It might be urged that motor transport would be practicable, but, in the very undeveloped condition of the motor-transport vehicle, and bearing in mind the many climatic difficulties of this purely tropical belt of Nigeria, I have grave doubts of the success of motor transport on any useful scale. Where animal transport is not practicable it would appear to be best to clear the native bush tracks for ordinary trade or, where justifiable, build very cheap tram lines based upon railways or navigable waterways.

(2) *Railways.*

(*a*) *South-West Nigeria.*

The south-west, which includes all territory west of the Niger not ultimately to be served by that waterway, is being developed by means of a railway system based upon the port of Lagos. From this point a railway of 3 ft. 6 in. gauge of a fairly high standard of construction has been constructed to Ibadan (125 miles) at a cost of £7,800 per mile, is being actually extended to Illorin, and approved to Jebba situated on the Niger, the financial resources of the country permitting of such development at local expense. In so far as its construction to Illorin is considered

* An interesting report on the Hausa States by Mr. Birtwistle, Commercial Intelligence Officer of the Lagos Colony, I believe, was forwarded to the Secretary of State lately. I fear Mr. Birtwistle, who supports Lagos as the Northern Nigeria outlet, has not given the commercial side of the railway question sufficient thought, but his impressions of Hausaland coincide with my own His optimism as to its future is great—provided always that efficient transport is organised.—E. P. C. G.
Appendix IV. Extracts from Mr. Birtwistle's Report.

the project appears economically sound, though the high standard of cost adopted would not appear to be justified.

It is proposed to extend the line from Illorin through Jebba to Zungeru, whence it would tap a main line leading on to Zaria and Kano. Such a line would pass through a country almost depopulated and incapable of affording much way traffic, therefore the remainder of the line to Lagos would have to support any loss in its working. The distance from Zungeru to Lagos would be about 400 miles, and, if cotton could be carried at three-pence per ton per mile, it could be landed at Lagos from Zungeru at about £5 a ton. This rate it should be remarked is considered unremunerative by the railway authorities. If a pioneer railway is constructed from the common competing point (Zungeru) to the Niger at Baro, there is no doubt in my mind that cotton will get to the sea at Forcados at £2 a ton or equal to a rate of about a penny a ton a mile on the Lagos Railway.

Personally, therefore, the policy of an extension through Jebba and the construction of a great bridge over the Niger appears to me ill-advised and unnecessary. The Lagos Railway may form the backbone of a considerable system for the south-western portion of Nigeria, but it is my firm conviction that in the economical development of Northern Nigeria we must place our reliance upon the existing waterways, supplemented by railway systems based upon them.

The Lagos system should connect with them at or opposite a common point on the River Niger, where, until a bridge was justified, a steam-ferry service should suffice. The traffic it will secure will be mainly that of European or native passengers, mails and fast perishable or high class goods. The connection will, moreover, permit of the Lagos traders, a most enterprising community, reaching Northern Nigeria by a direct route. Should the common point be Baro, it would not appear that the Lagos system would be in any worse position to compete (if it can do so) than if it came to Zungeru, and any such connection would pass through country of higher potential value than exists from Illorin over Jebba.

It would appear more judicious to spend any further available funds of Southern Nigeria in the completion to Illorin and on branches from the main line through other productive areas.

(*b*) *South-Eastern Nigeria.*

Of this section I can have little to say. As in the south-western portion of Nigeria, it would appear that any railway policy should aim at local development and not at reaching points in the far interior, much more economically effected by a line based on the Niger or the Benue. Eventually in a similar manner to the south-east a connection might be made with the north at some point on the Benue.

(*c*) *Northern Nigeria.*

Northern Nigeria, and by this term I mean to convey from a transport policy point of view all the country east of the Niger and north of the Benue after their confluence at Lokoja, presents to my mind an entirely distinct problem. Its southern confines in all directions are bounded by two great open navigable rivers—rivers to-day affording an efficient navigation, rivers, moreover, which at any time and at the very small cost of the annual upkeep of a few river dredgers can be improved up to a very high standard. Under such circumstances it does not appear possible that any railway system could compete with water-borne traffic. The choice of a base from which to use railways in conjunction with these rivers for the development of the north-east is geographically dictated by the course of the Niger. Baro, situated at the point where the river bends to the west, must be the primary base. Fortunately, it is in every way suitable and is in point of fact the only possible site north of Lokoja.

From Baro a railway should be constructed by way of the prosperous Nupe Province through the Gwari country south of the Kaduna River; thence a very rich part of the Zaria Province would be traversed extending to Zaria town; whence by way of Kudan, Rogo, and Yelwa, through a great agricultural country, Kano itself should be reached, a distance on the present surveys of about 400 miles.

I do not think the presence of the Zungeru cantonment should influence the choice of route. Universally condemned as a capital now, though dictated in position at the time of its choice, it must eventually, for the sake of the health and well-being of the central Government, be moved to one of the higher and more healthy sites which will be found all along the new line of railway.

Moreover, the probable staple exports of Northern Nigeria will not bear heavy rates, and everything points to the necessity of securing as short a line as possible as between Baro and Zaria, the first of the great producing centres. The line will in fact be an improvement on the alignment laid down in 1904, but, generally speaking, closely follow the route then surveyed but now no longer traceable upon the ground.

Having traversed the possible routes from end to end, I have no doubt of the feasibility of constructing a cheap pioneer line on an alignment which can be improved as traffic justifies it. It will be a line of easy gradients through what I must call a very rich country, and, though too much must not be expected in the commencement owing to the undeveloped nature of the inhabitants, its promise for the future would appear distinctly bright. The line can undoubtedly be built for, say, £1,200,000, or £3,000 per mile, and at such cost rates of carriage should be possible which will permit of the export of the staples of the country with profits remunerative to both producer and exporter.

The general railway policy to be aimed at for Northern Nigeria in my opinion should be:—

(1) That the Northern Nigeria railway system must be based upon communication with and evacuation by the Niger and Benue navigation.
(2) That the eventual base may be Lokoja at the junction of the two rivers. This will not be necessary for some years, as dredging operations can be undertaken to render the river available above Lokoja.
(3) That its primary base might be either of the two most geographically suitable sites on the navigable Niger or Benue above Lokoja, whence a railway could be thrown towards Kano.
(4) That taking the existing administrative, agricultural, and mineral, development into account the Niger base is apparently the best to consider and operate on at first.
(5) That this base should be Baro.
(6) That the line or lines should be built and worked under local control, economy of construction being secured by a low standard in structures, buildings, &c., without sacrificing hauling capacity, and by utilising to their utmost the services of the civil, military, and marine, Departments of the Protectorate.

Summary.

Summarising the policy for Nigeria as a whole there would be three railway systems:—

1. South-west;
2. South-east;
3. North.

The South-west, based on Lagos and Sappeli or Warri, would confine itself to local development, and exchange with the north any goods its rates would permit by means of a steam-ferry at Baro.

The South-east, based on Calabar, would develop its local resources by river and rail and look eventually to a rail connection with the north at some point on the Benue.

The North, based on the Niger and Benue navigation, would develop its resources by one and eventually two great transport lines, the first viâ the Niger and Baro to Kano, the other viâ the Benue and north-eastwards to Bornu from a selected point where reasonable navigation could be secured at low cost. The second of these routes would not be required for some years.

Finally when joined together all would come under one control and management.

VI.—Estimates.

Estimates for 125 miles of line as between Zungeru and Baro were prepared by the Consulting Engineers and the Director of Public Works, Northern Nigeria, previous to my leaving England. These estimates, which were worked out in detail and came to £3,000 per mile, were reviewed by me and had my approval. After my departure small details were thoroughly gone into by the same officers and a complete set of indents made out ready for the placing of orders. These indents

I have now inspected and find complete and satisfactory. Rates of freight from England were gone into with Messrs. Elder, Dempster and Company, who unofficially quoted rates much below those estimated for, and I see no reason to presume that they will be exceeded at any future time, when we call for tenders. I should even look to a further reduction.

I have not forwarded my copies of estimates or indents owing to the already bulky nature of the report. They are, however, available for reference at the offices of the Consulting Engineers and will be found to be very complete for the proposed work. In building a pioneer line much latitude must be allowed in adapting it to local requirements and a further use of local timber or even sleepers might considerably reduce the total, any such surplus being devoted to improvements in other directions up to £3,000 a mile, at which figure I consider a pioneer line can be built and equipped.

Appendix I.

Notes on Baro Terminus (with Maps*).

Plan attached.

1. Baro Wharf from 0.0 to 1,000 feet. Scale 40 feet—1 inch.
2. Cross section at from 0.0 to 400 feet. Scale 20 feet—1 inch.
3. Cross section at from 500 feet to 9,000 feet. Scale 20 feet—1 inch.

Baro is situated on the left bank of the Niger about 12 miles below Egga. Immediately to the south of the village the ground rises steeply from the river bank to a height of about 400 feet. On top of this hill is a plateau running for about half a mile in a north-easterly direction inland. The steep slope follows this line and then sweeps back to the westward towards the Niger. The small village of Baro, better known by the natives as "Gidi," lies in the hollow thus formed. It will probably be found necessary to move the village down stream (below 0.0 on plan) for sanitary reasons, and this can be done at a trifling cost.

Unlimited quantities of stone (laterite) for pitching banks is available, also timber for fuel or temporary bridges, and clay for brick burning. A good site for Europeans is found on the face, or on top, of the steep slope, well away from all native huts, and ample supplies for labourers employed on the railway are procurable.

The wharfage accommodation is shown on the plan and with a comparatively small amount of earthwork three steamers of the Lagos branch boat type can be unloaded at the same time. The approximate position of these boats when unloading is indicated. Allowance has been made, as will be seen from the sections, for a draft of 10 feet. It is not expected that steamers drawing more than 8 feet will be available, and the distance of steamers from wharf would then be less than is shown.

Provision has been made and is shown for stacking 5,500 tons of rails or sleepers on the wharf, and space has been left for additional sidings or for stacking materials as may be required.

A. C. Ridsdale.

Appendix II.

Report on the Rivers Niger and Forcados from Forcados to Baro.

Coulton Elliott,
Marine Superintendent.

May 12, 1907.

Forcados to Burutu.—Good anchorage for vessels of almost any size (19 feet is the present limit for vessels crossing from Forcados bar). The anchorage is very safe and good; water 5½ fathoms, bottom mud and sand. Forcados anchorage.

Elder, Dempster and Company have a large floating dock at Forcados, able to take vessels up to about 250 feet long and 1,500 tons capacity. Engineering shops Floating dock.

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* Not reproduced.

attached to the dock are erected on the shore half mile distant, fitted with powerful shearing and punching machines for dealing with heavy ships' plates up to ¾ inch.

Burutu. At Burutu, about 5 miles from Forcados, is the Government receiving depôt, and is accessible for vessels of 6,000 tons and draught 17 feet. The Niger Company have their main receiving depôt at Burutu; and both they and the Government have piers at their wharves to enable ocean steamers to go alongside to load or discharge cargoes, and also coaling wharves. The depth of water at Government pierhead is 17 feet. The flood and ebb tides run from 2 to 2½ knots. The Niger Company has two slipways, one for small vessels up to 75 feet, and a large one for vessels up to about 200 tons deep-water capacity.

Speed current.

Chart. Tracing sketch survey taken 1896 spring use at Burutu 4½ feet neap 3¼ VI. H.Q.M. F. and C. Forcados to Gana Gana. Burutu to Asseh and to junction of Forcados River and the Niger.

Burutu to Asseh.

In order to reach the Niger from Burutu, a vessel has to navigate the Forcados River which joins the Niger about 110 miles from Burutu. The Forcados River is affected by tides for about 90 miles (Williams, Master of the "Empire," says, "2 feet rise and fall by tide at Asseh") and is navigable for stern wheelers (6 feet draught) all the year round (3 feet 6 inches only on Warri Flat at low water, see chart), and for small ocean-going vessels of from 250 feet in length (1,000 tons capacity) during August, September, and October. Vessels drawing *over* 15 *feet* cannot reach Asseh owing to the shallow water between Burutu and Bacaba (see sheet No. 1. 276 miles from Lokoja), but as the ocean steamers (branch steamers) are constructed to carry heavy loads on a shallow draught (1,000 tons on 10 feet) the shallows are no greater barrier to navigation on that river. The Forcados River varies in width from 200 yards to about 400 yards up to about Sagbama (226 miles from Lokoja), the river then widens, varying in width, from 500 to 1,000 yards.

Branch steamers.

1,000 tons on 10 feet.

Width of Forcados river.

Current. From Burutu to about 20 miles up the river the flood tide varies from 2½ to 1 knot per hour, and runs for 3 hours; and the ebb tide from 1, 2, to 3 knots per hour and runs for 9 hours, depending on the state of the tide in both cases. Vessels anchored up on the Forcados River do not lie-to flood tide except within about 6 miles of Burutu. The current varies, approximately, from 1 to 1½ knots per hour, increasing in speed as Asseh is approached. There is never any difficulty experienced in navigating the Forcados River (vessels of over 4 feet now wait for tide at lowest river at Forcados Flats, 3 feet 6 inches low water), the channels are deep and well defined, and for the greater part of the 100 miles the water is deep close to each bank. The banks of the river are very low at Burutu (about 1 foot above high water) with mangrove trees growing with their roots in the water, the height of the banks gradually increasing to about 20 feet at Asseh. Very thick bush, with high trees (palm kernels, &c.), grow close to the edges of the bank. No rocks. Banks are very soft mud, and sand and mud banks are met with in the wider parts of the river. The flood waters of high river (August, September, October) do not affect the height of river much at Burutu. At Syama, about 5 feet rise; at Sagbama, about 7 feet rise; at Asseh, about 15 feet; the flood water finding its level in the numerous creeks joining Forcados River, the muddy water of flood showing 15 miles out at sea. About 2 miles below Asseh is Patani crossing, reported bad about 1898 in lowest river, that was before Akassa Creek was closed to steam navigation at low river. No regular steam traffic at that time passed Patani. Akassa is now closed to steam vessels of any size during low river. (See Sheet 2, Tracing of River Niger from Junction of Forcados and Niger Rivers to Lokoja and Appendices.)

Direction taken by river. From the junction of the rivers to Lokoja is about 203 miles, the river running from Lokoja almost due south for 90 miles, south by east for about 40 miles, south by west for about 50 miles, and south-west for remainder of distance to junction.

Current. The average speed of current varies from 1½ to 2½ knots. Experiments in April, 1907, made it 1·8 knots about Illushi.

Shallows. During April, 1907, soundings were taken at shallows between the junction and Lokoja, and about nine shallow places were registered. When the river is at its lowest (about *May 20th*), there would be about 3 feet 6 inches water in these crossings, showing in April, 1907, 5 *feet*, but all years do not register the same at lowest river; for instance, 1902, 3 feet 6 inches; 1903, 3 feet. 1904, 2 feet 6 inches (for about 10 days); 1905, 3 feet 6 inches; 1906, 4 feet. I think 1907 will remain 3 feet 6 inches* in shallow places during lowest river.

Depth over shallows lowest water.

* NOTE.—May 12th, river will not have less than 4 feet at shallows this low river.

The following table gives the average rise or fall per month since 1902, taken at Lokoja:— Rise and Fall of Niger, see Chart, Annual Report, 1905-6.

			Amount of Rise or Fall.	
			ft.	in.
May	31		—	
June	30	Rise	4	0
July	31	„	8	0
August	31	„	7	0
September	30	„	8	0
			27	0 Rise.
October	31	Fall	13	3
November	30	„	9	0
December	31	„	1	0
January	31	„	0	6
February	28	„	0	9
March	31	„	0	5
April	30	„	0	1
May	31	„	2	0
			27	0 Fall.

Rise.

Fall.

Bed of river.

The bed of the river from the junction of Forcados River to Lokoja is of a fine sand, consequently the direction of the channels is constantly varying from the shifting sandbanks, the channels never remaining the same year after year. Just after flood river the channels are badly formed, and it is well towards February before the channels through the sandbanks begin to form and show clearly the places where the deepest water will be found.

Dredging Channels.

Dredging.

Buoying of crossings.

The matter of dredging a 5 feet channel has been considered, and, in order to maintain a channel of 5 feet throughout from Burutu to Lokoja—judging from the lengths of the various crossings and from information I have been able to gather from natives who have spent their lives on the river—I estimate that there would be under four miles of dredging to do every year, probably less as time went on, as the dredger would do such a lot of scouring that the high rivers would not probably fill up or alter the dredged channels so much. The buoying of the various crossings could be easily arranged for. In steaming up in the "Corona," on April 15th, 1907, and taking soundings across the shallows, the shallow water generally lasted about two or three soundings taken at 10 *seconds interval*, steaming 5 *knots*, and then it was not certain that the vessel was in the channel. Water soon got deeper, and I think it is quite possible when the deepest channels are followed in dredging that 200 yards would be an over-estimate to each of the nine crossings taken in the "Corona." That would place the distance to be dredged at 1,800 yards.*

Months of working dredger.

The best months for working the dredger would be February, March, April, and May. After May the dredger would move up to work between Lokoja and Mureji, as the water is lowest in that part in June and July.

The junction, see sketch map.

Entrance to Niger River from Forcados is at the junction of the Forcados River with the Niger. It is seen that the waters running down the Niger River to Akassa (Akassa Creek) and to Forcados River are divided by a large grass-covered wedge-shaped island with the point of wedge to the direction of the current, and at the east point of the island is a very large sandbank. The river here is about 2,500 feet from bank to bank, which in some years silts up more towards one side of the river than the other. In 1907 the sandbank is well over towards the south side, practically blocking the Akassa entrance, but some years ago (about 1898) the Akassa entrance (Niger proper) was open to traffic in April, Forcados River not then being much used—(Williams, Master of "Empire," says he thinks the increased traffic has a decided tendency to keep the channels open)—and there was a bad crossing at Patani about two miles below Asseh which has been scoured out since 1898. It is, of course, extremely necessary that the sand on this east point of the grass-covered island referred to at the junction, is kept from silting up across the Forcados River entrance, which is now so largely used, or the latter may become

Traffic tendency to scour channels.

* This is a much lower estimate than mine—1 mile; I gave 7.—E. P. C. G.

blocked, and vessels would find difficulty in getting back into Forcados River at lowest river through Akassa creek.

Dredging. A little dredging at that point would ensure the maintenance of the channel to Forcados River.

Lokoja to Muragi.—(Reference: Admiralty Chart by Lieutenant Glover, R.N., 1869. Sheets No. IV, V, VI. Tracing sheet No. 3 Lokoja to Baro.) These charts show the river and contours of surrounding land well, and the distances appear to be correct. The approximate distance from Lokoja to Baro is 69 miles, Egga 78, Muragi 123. The channels are well defined. The average depth at lowest water on crossing would be from 3 feet to 2 feet 6 inches, and remain low for about three weeks in June, the difference of rise between lowest rivers varies about three weeks. On the first rise about early July, the river rises 3 inches to 6 inches a day and is full about September 20th.

The river from Lokoja to Baro.—There are numerous small islands (as shown on chart); banks from 15 feet to 20 feet high; but during high river the land is flooded in places almost completely. The bed of river is of sand and no rocks are to be seen even on the banks. The current runs at two to two and a half knots.

Steamers drawing 5 feet, shallow draught vessels 160 feet by 30 feet by 4 feet 6 inches (capacity, 200 tons), fitted with independent paddles can navigate for ten months of the year with safety to Muragi, and for the remaining two months it can be navigated by steam canoes towing one to ten tons barges drawing 2 feet of water. During 1906, river not closed to 2 feet 6 inches steamers (75 feet by 18 feet by 4 feet 6 inches).

There are five crossings from Lokoja to Baro, but none appear to be more than 200 yards long, and the soundings rather tend to indicate that the actual bars are not more than 100 yards each. The whole length of bars between Lokoja and Baro might be put down at 800 yards.* The "Corona" (160 feet by 30 feet by 5 feet, drawing 2 feet 3 inches) navigated this part of the river with ease on April 10, 11, 12, 13, 1907, Sir P. Girouard being on board, landing alongside Baro in 12 to 18 feet of water (deduct 2 feet 6 inches, lowest water) 2.30 p.m., April 11, 1907.

Egga. Egga is 283 feet (Glover's chart) above sea level, and, calculating distance from Samabri to Egga to be 300 miles (approximate), the fall per mile is ·72 of a foot.

Appendix III.

Report on the Transport of Railway Material from Forcados to Baro.

Coulton Elliott,
Marine Superintendent.

May 11, 1907.

Transport of Railway Materials from Burutu to Baro, Distant 390 Miles (Approximate).

Assuming that Baro is decided upon as the terminus of a railway through the centre of Northern Nigeria, from Baro viâ Bida, Zungeru (or near) Zaria and Kano, it is, I think, generally understood that it is decided that most of the railway materials for a year's working should be carried to Baro from the sea during the high river; that is July, August, September, and this amount of materials is put down at 15,000 tons. In order to cope with this large order it will, of course, be necessary either to (1) charter direct from England; (2) or charter branch steamers to load up out of ocean steamers at Burutu and transfer same up the river to Baro. I am much in favour of the latter method, because I am of opinion that in the former case there will be a difficulty in finding vessels of suitable draught, &c., and the branch steamers employed on the coast are very suitable for the River Niger at high river carrying 1,000 *tons* on 10 *feet*. I do not think it probable that the branch steamers available would be able to cope with the whole 15,000 tons, and allowance must be made for bad trips of branch steamers, groundings, and other contingencies. In order to meet any emergency and also to assist in giving quick despatch to the branch steamers at Baro, it would be advisable to order four to five lighters and one tow boat for lighterage.

Branch steamers.

Assistance of railway tug and lighter.

3 branch steamers. As before stated, there are practically three months to cope with the 15,000

* This added to previous 1,800 yards to Lokoja would give 1½ miles from Baro to the sea for a 5-feet channel—I gave 9 miles for a 6-feet channel and must therefore be well within the mark.—E. P. C. G.

tons, and I assume there are three branch steamers* to deal with it, and I will give each of the steamers four trips during the three months from Burutu to Baro (three months equals 90 days).

Loading at Burutu	6	days.
On voyage	7	„
Discharging at Baro	8	„
To Burutu	4	„
Three trips of	25	days = 75 days.

Under good circumstances 90 days may cover 4 trips—4,000 tons each steamer; that is, 12,000 tons for the three steamers. Under the above conditions 3,000 tons remains to be transported, and the river is good for 15 to 7 feet during October, November, December, January, and February. With a tug and four lighters,† with assistance from the Northern Nigeria Marine, the remaining 3,000 tons could, I think, be dealt with, and when the railway is complete the lighters will be available for transport work.

Tugs and lighters.

A suitable tug (a stern-wheeler, 75 feet by 15 feet by 5 feet) would cost about £5,000, and each lighter, as per tracing, about £1,200; making a total of £9,800 for transport. The lighter will be suitable for railway material, cotton, oil casks, &c. See plan‡ of lighter.

Suitable tug and lighters.

I estimate cost of freight, Liverpool to Burutu, per Elder, Dempster & Company, will be about £1, and £1 may cover cost up river. I do not think a direct chartered steamer would do it for less, unless freight were offering.

Cost of freight per E. D. & Co.'s branch steamers.

It would be advisable to have an efficient receiving staff at Burutu to reinforce the present Marine Staff—a European supervising tally clerks. The Assistant Marine Superintendent at Burutu would see to the arrangements for despatch of vessel after loading, and arrange for re-loading.

Estimate too high. E. P. C. G.

Each vessel would be supplied with an efficient river pilot, and the best Northern Nigeria marine pilots could be spared for the work without interfering with the Northern Nigeria Government transport, as it would be high river. I recommend a "dash" to all pilots of from £3 down, payable after a successful trip, deductions made for groundings.

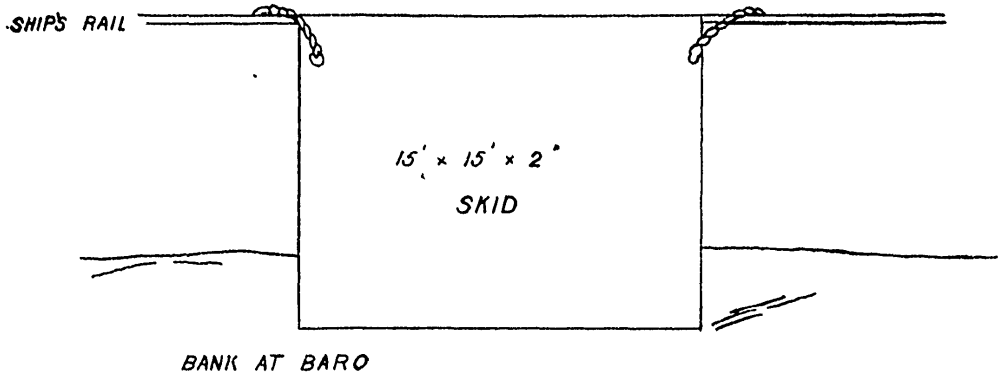
Pilots for navigating ocean steamer up Niger.

I would suggest a special officer detailed off to the work of landing materials at Baro; a man with a good knowledge of stevedoring work.

Receiving and arranging landing materials at Baro.

On attached tracing will be found two methods shown as suggested for discharging the railway material. I estimate that the ship's deck and the rail will be about 8 feet out of water when loaded, and I have given the derrick length as 30 feet, which would—as will be seen in Fig. 1—clear the ship's side by 8 feet; but, I think, even with a skid (a movable stiff wooden bed or shield, built up about 15 feet by 15 feet by 15, which is hung from the vessel's side with bottom edge resting on the bank) there will be difficulty in landing the rails, and I recommend method shown in Fig. 2. But it will be as well to make four skids, 15 feet by 15 feet by 2 inches in radius, as sketch below, in case they are required.

Method of landing.

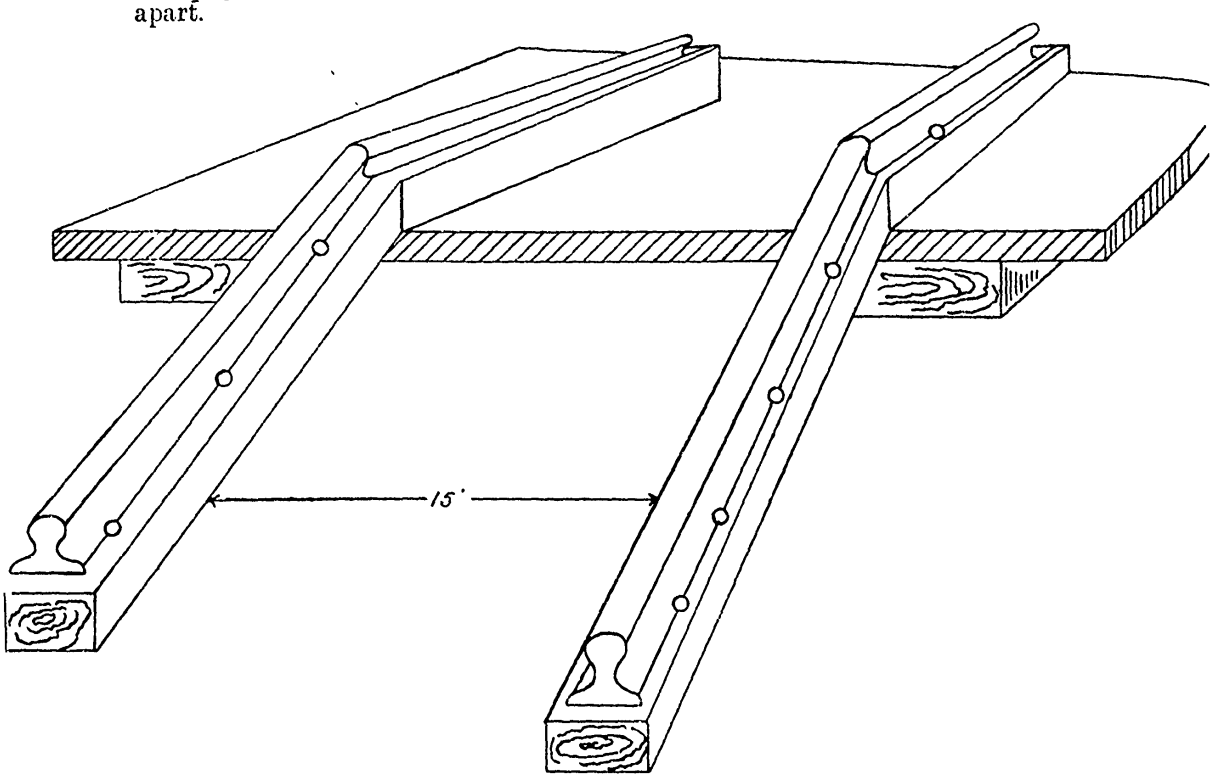


* Messrs. Elder, Dempster & Company proposed five, which would obviate many of Captain Elliott's difficulties.—E. P. C. G.

† A tug will not be sanctioned, but lighters will be provided, and Messrs. Elder, Dempster & Company were asked to quote for them.—E. P. C. G.

‡ Not reproduced.

The platform is shown in Fig. 3, and consists of a strong platform erected on the deck of the steamer and of sufficient size and strength to allow for labourers handling rails; as the sling is taken off the rail will fall over slide rails, about 20 feet apart.



Rough sketch Landing Platform, fixed on trestles about 20 feet by 6 feet.

Lighters. Lighters of 100 tons capacity would load at outside of vessel to receive material, and it should be possible to get rid of 200 tons from the vessel, and in this manner ease the land side discharge and rail-stacking yards.

No. 17.

COLONIAL OFFICE to TREASURY.

[*Answered by No.* 21.]

(Extract.)

Downing Street, July 10, 1907.

With reference to your letter of the 11th of June,* I am directed by the Earl of Elgin to transmit to you, to be laid before the Lords Commissioners of the Treasury, a copy of a despatch† from the High Commissioner of Northern Nigeria, enclosing his report upon the question of transport in Nigeria.

No. 18.

Sir W. EGERTON to COLONIAL OFFICE.

(Received July 15, 1907.)

Sir, Tolpuddle, Dorchester, July 13, 1907.

I have the honour to forward herewith, for the consideration of the Secretary of State, a rough memorandum written after perusal of Sir Percy Girouard's proposals† for railway construction in Northern Nigeria.

I suggest, for his Lordship's consideration, the advisability of pushing on the Lagos Railway viâ Jebba to Zaria and Kano at once, and at the same time of building a line from Baro through Bida. The two lines will join somewhere in the

* No. 15. † No. 16.

vicinity of Zungeru, but there is no necessity to go to that place beyond the fact that by the Jebba route the line to Kano will naturally go near Zungeru. The section from Baro to meet the Lagos line will pass through populous country, and receive a considerable traffic, while the Jebba route, being direct and through easy country, will be the cheapest *rail* route from Kano to the sea, and will open up a much greater area of Northern Nigeria than a line from Oshogbo—or elsewhere on the line—to Baro.

When the total expenditure is considered, the construction from Illorin, viâ Jebba, to meet the Kano-Baro trace will not cost very much more than from Oshogbo to Baro, and the Jebba route will meet with the support of the Lagos community, while I do not think a line to Baro would. Everything is ready for commencing construction viâ Jebba—construction viâ Baro must await survey, and most unfavourable reports have been given of the country between Oshogbo and Baro.

I have, &c.,
WALTER EGERTON,
Governor of Southern Nigeria (on leave).

Enclosure in No. 18.

In commenting on this report and its enclosures I suffer from the great disadvantage of having no papers or records to refer to.

SECTION 1.—THE HARBOURS OF NIGERIA.

The river mentioned as the Abeokuta is the Ogun, which runs close to the town of Abeokuta. In speaking of the rivers of Southern Nigeria or the Niger Delta it is hardly correct to infer that only the Cross River and the Opobo have sources independent of the Niger. The more correct description is that the other rivers, though having sources independent of the Niger, connect with one of the channels of the Niger Delta before reaching the sea. During the last three years a considerable sum has been spent in improving the navigation in these rivers and in the network of creeks which lead to the sea; and at present Government passenger launch services run through the creeks the whole way from the French boundary to Opobo. Beyond Opobo there is no communication by inland waterway with the Cross and Calabar Rivers.

Prevailing Winds.

The tornados are sudden squalls generally lasting not more than half an hour.

The Niger Ports.

I do not agree that the volume of water passing through the mouths of the various rivers depends principally upon the fresh water coming down the rivers except during the three or four months of the rainy season. To take the case of the Benin River alone, an enormous quantity of water passes in and out of its wide mouth at each tide; and yet the rivers of its Hinterland are small. Although it has good water communication with the Niger, the tides meet in the creeks between the Benin and the Niger, and this shows that none of the Niger water escapes to the sea through the Benin entrance.

Description of Steamers.

I quite agree that improved, or rather larger, boats are required for cheaper freight transport and for a more comfortable passenger service, and that this can only be attained by providing greater depth of water on the bars. Forcados and Calabar are served by separate services; the steamers of the mail service that serves Forcados have their terminus at that port. Were it not for the transhipment of the Lagos trade at Forcados, the tonnage shipped at that port would, I believe, not equal that shipped from Calabar or Opobo. That is, of course, excluding the shipments from Warri and Sepele, which are served by cargo steamers and not by the main-line service. If Forcados bar can be deepened at a reasonable cost to 24 feet and maintained at that depth, and shipowners are willing to pay the dues necessary to meet the expense of carrying out the work, it should certainly be undertaken. But it should be remembered that the deepening of the Lagos bar is essential, and the works necessary to effect it have been commenced, and that when

the Lagos bar is deepened Forcados will lose probably more than half its present trade. I do not doubt that with the construction of railways in Northern Nigeria, and the improvement of the Niger waterway, the Northern Nigerian trade will considerably increase, but it will take a good many years before that trade makes up for the loss of the Lagos transhipment trade. There is, further, the almost certainty that, on the deepening of the Lagos bar and the extension of the Lagos railway to the Niger, the greater part of the passenger traffic to Northern Nigeria will be viâ Lagos, and that the large mail steamers will call at Lagos and discharge their passengers and their Lagos cargo at Lagos before proceeding to Forcados. They will, therefore, enter and leave Forcados with lightened cargoes, as they will fill up at Lagos before proceeding on the voyage home, and the deepening of Forcados bar will be less necessary. The depth of from 21 to 23 feet proposed by the Consulting Engineers in 1892 for Lagos was merely the depth that was considered amply sufficient at the time, and there is little doubt that if the complete scheme of Messrs. Coode, Son, and Matthews is carried out with the assistance of the dredger now owned by the Colony, the anticipated depth, without dredging, could be increased by another four or five feet with dredging. The depth of water on the bar is simply a question of expenditure, and, on the 1905 trade, the tonnage rate of 5s. a ton now charged for transhipment at Forcados would produce a revenue (£60,000) sufficient to pay the interest on an expenditure of 1½ millions, or nearly *double* the estimated cost of the complete scheme to ensure a depth of from 21 to 23 feet. There is, therefore, ample margin for further expenditure to obtain any depth that may be required.

In discussing the question of the improvement of the port of Lagos, the High Commissioner of Northern Nigeria has overlooked the fact that the improvement is essential for the proper handling of the trade of the territory which formerly formed the colony and protectorate of Lagos. That the carrying out or not of this large scheme is in no way dependent upon Lagos becoming in the future the port of the great hinterland of Northern Nigeria, but that the trade of the Colony has for a long time required a better means of shipment than by the branch steamers to Forcados; the double handling of cargo in Lagos and in Lagos Roads and Forcados from small branch steamers in the damp climate with its heavy rainfall causes great damage to many classes of goods; and the actual cost to merchants cannot be measured by the additional charge of 5s. per ton on cargo. There is also the costly and exasperating delay in obtaining delivery of goods. The voyage from England now takes 16 days. The commencement of the delivery by branch steamer rarely commences within a week of the arrival of the mail steamer at Lagos, and is only completed about three weeks after that time. Merchants and those familiar with trade will understand what an immense handicap this is, and how no efforts should be relaxed to do away with it, and make use of the really magnificent harbour that Lagos possesses. It must be remembered that the Lagos trade is at present far more important than that of Northern Nigeria. The natural conservatism of men—I speak not of politics, but of the conservative instincts of men of all classes—never fails to supply numerous objectors to any designed improvement, and no better example can be quoted than the frequent objection which is raised that when the Lagos bar has been deepened the Lagos lagoon is not suitable for accommodating large steamers. To combat this argument it is only necessary to refer to the Admiralty Chart of Lagos Harbour, and to ask anyone familiar with dredging operations the cost of removing the few shoals that exist in the main channel between the sea and the railway wharf at Iddo which is about five miles from the sea; through nearly the whole of this distance a deep channel exists, and a very small expenditure would deepen the short banks that cross it in two places, and to widen it where necessary. Throughout the greater portion of this five miles absolutely smooth water exists with deep-water frontage far superior to anything at Forcados. The lengthening and strengthening of the Customs wharf, and the deepening of the water along this frontage is already being taken in hand, and by the end of 1908 that wharf will be suitable for berthing large ocean steamers.

The lengthening of the Iddo Railway Wharf is already under discussion, and as soon as the harbour works approach completion, the depth of water alongside that wharf will be increased to accommodate the ocean steamers. With the extension of the Lagos Railway, and the consequent great increase in the output of cotton and palm kernels, the import and export trade of Lagos is increasing, and

will increase; and even should the great mistake be made of not continuing the Lagos Railway so as to delay Lagos becoming the railway port of Northern Nigeria, the trade of the western provinces of Southern Nigeria and the large portion of Southern Nigeria lying south of the Niger is amply sufficient to warrant the expenditure of the million that may be required to give proper shipping facilities in the Lagos lagoon, and to create and maintain a deep channel to the sea.

Sir Percy Girouard quotes the extraordinary notice of Lagos given in the "African Pilot" issued by the Admiralty, although he omits the comical reference in the "African Pilot" to stretches of land with men and cattle breaking away from the shore, and men and animals being carried out to sea by the current. I called the attention of the Director of Marine to the absurd description given of Lagos Harbour a few months ago, when the 1907 edition was issued, and asked him to take steps to have a correct account of the Lagos Harbour inserted in the forthcoming issue. In the wet season the water carried out at ebb tide is of a brown tint, though not so brown as the waters of the Thames and Mersey, and as for the sickening odour there is the usual slight mangrove smell that is met with in all mangrove rivers (not of West Africa alone), and which was formerly thought to be so deadly, but which medical science has lately shown is not responsible for any of the sickness experienced by Europeans in these countries.

The bar certainly shifts, but the shifting is as a rule very gradual. The depth has altered as much as 3 feet in one week, but from records recently published in the Lagos Government Gazette, it can been seen that it has not altered as much as 3 feet in several years. I doubt if it has in ten years. No one, however, would say that the entrance to Lagos is easy at present, but the fact that the entrance is barely half a mile wide and that the ebb and flood tide is very swift is in favour of that entrance being permanently deepened by the construction of moles.

As I have pointed out previously, I found when I reached Lagos that although some ten years before, Messrs. Coode, Son, and Matthews, when the question of dredging Lagos bar was under discussion, had asked that certain observations might be taken to ascertain whether dredging was possible. Such observations had not been taken. I had them taken, and the result was so favourable that an experienced dredger-master was engaged and took observations on the bar for some months, with the result that it was found that dredging was quite easy for the greater portion of the year. The large pump dredger, recently purchased, arrived in the Colony at the end of May, and commenced work at the worst season of the year—June, July, and August being our roughest months. Detailed reports of its work have not yet been received, but I know that it has been dredging, although, when it was ordered, it was not contemplated that it would be able to work during this season of the year until the channel had been considerably deepened.

The Lagos trade is quoted by Sir Percy Girouard as having been one million in 1892. It was considerably over two millions in 1906, and will very soon, I hope, reach three millions, and that is without any trade from Northern Nigeria. The estimated saving in freight by the establishment of a deep-water channel over the Lagos bar at 5s. a ton on a trade of 240,000 tons is £60,000, so that if a charge of 5s. a ton were levied, a sum equal to four per cent. interest and sinking fund on a million and a half would be received. But it is estimated that at the utmost not much more that half this expenditure, or £750,000, would be required. But three days ago I received a letter from Sir Alfred Jones stating that the annual cost to his steamship companies of the transhipment at Forcados was 12s. 6d. a ton, or two and a half times the estimate given above. If Northern and Southern Nigeria are amalgamated, as no doubt they will be within a few years, no doubt any expenditure on the Lagos Habour will form part of their joint debt, but such expenditure will not be any burden upon the new administration. It will be rather a great source of profit, for all improved facilities for trade and shipping are indirectly profitable to the administration, and in this case the pecuniary charge for interest and sinking fund can be raised by a very small tonnage charge on the trade—a tonnage charge which will not be a burden on the trade, but which will relieve it by reduced freight-rates of a great deal more than the Government tonnage dues.

The Port of Forcados and Forcados River.

I have always said that the Port of Forcados has a great future. Being the entrance to the Niger and the immense hinterland of that river, and also to the im-

portant ports of Warri and Sepele, Forcados must in time become a very important seaport, although it is destined to lose the transhipment trade of Lagos; but it is a great mistake to say that at Forcados good firm ground is available for wharfage. I do not know a better instance of soft black mud mangrove swamp than Forcados presented three years ago. Since that time both the Government and Messrs. Elder, Dempster have spent large sums of money in reclaiming ground, and in this way a small area of ground above sea level has been created. But it is so soft that my Public Works Department insist on the necessity of iron buildings in lieu of brick for the new marine workshops which are being erected there. Firm ground can be created there, and is being created, but only at very considerable expense, whilst at Lagos there are several miles of good, firm ground available for wharf frontage, though it will be a long time before one-half of it will be utilised. That I recognise the importance of Forcados is proved by the large amount of money that is being spent there on my advice, and by the establishment there of large marine workshops, and Sir Alfred Jones also recognises it, and has selected Forcados for his floating dock and workshops. But Forcados has the great disadvantage of a scarcity of labour. All labour employed there has to be imported and employed permanently, and the labourers have to be housed and paid higher wages than at Lagos. Moreover, there is no doubt that as soon as the Lagos bar is deepened Messrs. Elder, Dempster and Company's floating dock and workshops will be removed to Lagos. The Government workshops now being erected at Forcados will still be used because they are only designed for the repair of river craft that cannot safely proceed to sea for repair at Lagos or elsewhere. I should hardly venture myself to suggest that the Forcados bar can be deepened at a small cost. I hope this may be the case, but it seems to me extremely doubtful. The Forcados River and entrance were surveyed by the Admiralty only a few years ago—in, I think, 1901 or 1902. In 1906, at the request of Sir Alfred Jones, the Admiralty was again approached regarding a re-survey of the entrance and the reply received was that as the bars of the West African rivers (and this was evidently so in the case of the Forcados River, for the entrance had only recently been surveyed) changed so frequently it was useless to send a ship for the purpose. This hardly tallies with the statement that the bar shifts but little laterally. I shall watch with great interest any efforts to improve the Niger River. The improvement contemplated by the High Commissioner of Northern Nigeria would immensely cheapen transport on the Niger. On arrival in West Africa I mooted the question of improving the channels of both the Niger and the Cross River, but my marine advisers deprecated any attempt on account of the great cost of such work, and the comparatively small tonnage of freight at present passing up and down the rivers. I have discussed the question with various people, and the general objection put forward is that the cost of deepening river channels is always very difficult to estimate—that in clearing away a shallow at one place it is very probable a shallow may be created in another, for the clearing away of shoals means the lowering of the level of the river at all points above for a considerable distance. The experiment, however, is well worth trying—in fact, must be tried if Northern Nigeria is to continue to depend upon the Niger. As long as navigation on that river is so costly and uncertain, trade in Northern Nigeria can only be conducted by companies with very large capital.

Existing Transport of Southern Nigeria.

Along the coast, and for some way inland the transport is entirely by water. In the interior—and it must be remembered that Southern Nigeria does not merely consist of the network of creeks adjoining the sea, but includes a considerable portion of firm land—transport is by railway and by head carriage. It is only in the western or Lagos province that caravans come down from the far interior of Northern Nigeria to sell and buy goods in Lagos. These caravans bring cattle and goods. The goods are brought by head carriage and on donkeys. A considerable quantity is carried on donkeys, and this method of transport seems to be satisfactory and economical to the native. The donkeys do not suffer much from the climate, but their loads are small, and attempts to use this method of transport by Europeans have not met with any success. Roads are being constructed branching away from the railway. The only one completed is 34 miles in length, from Ibadan to Oyo, and on this one motor van, carrying one ton, was placed in the early part of 1906. Naturally, on a new road in a new country, with this comparatively new method of transport, some difficulties have been met with, but in a recent report by an expert on the

subject, most of the breakdowns have been traced to unsympathetic treatment of the vehicle. A second van is on the road and a third is being ordered, and I am personally convinced that care and patience only are needed to make motor transport thoroughly successful in West Africa where animal transport is not possible. The chief objections to the service that have been raised by its opponents are the cost. I do not dispute the cost. I can only say that it is about one-third the cost of head transport. I hope that by motor vehicles the feeder-roads traffic will be developed, and as soon as traffic on any particular road has developed sufficiently to show a fair prospect for a light railway a railway should be constructed to take the place of the road for through transport, though the road will still continue to be used as a means of access from station to station; and further roads should be pushed on ahead of the railway terminus. This is the present policy of the Southern Nigerian Government.

The Lagos Government Railway.

I cannot dispute the fact that the rates of freight on this railway are high, but they are not nearly so high as on other West African railways, and they have recently been considerably lowered for several important products. As the railway lengthens the cost of transport per mile will naturally diminish, as also will the cost as the traffic increases. I have the advantage of the 1906 report, which had not reached the High Commissioner when he wrote his despatch. This shows that the nett receipts in 1906 had risen from £6,942 in 1904 to £15,873 in 1905, and £24,368 in 1906, and the increase for 1907 will be very much greater if the improved traffic returns for the first half of the year are maintained in the second, and there is no reason to think that they will not be. The increase in 1906 is not due to any increased mileage, as only 30 miles of the extension was opened to traffic, and that only took place at the end of October. Further, the increase in 1906 was in public merchandise and not railway construction transport. Although the passenger fares were decreased there has been a most satisfactory improvement in receipts from this class of traffic. And there is no doubt that the native population will year by year use the railway more if the fares are kept at a reasonably low amount. In May last special through rates on certain classes of goods traffic came into force, and these show how cheaply traffic can be carried by the railway if actual cost only is considered. The distance from Iddo to Oshogbo is 186 miles, and the rate per ton now is—

	s.	d.	
Maize	15	9	a ton.
Ground-nuts	15	0	,,
Coal	20	6	,,
Cotton-seed	25	0	,,

The distance from Oshogbo to the Niger is only 120 miles, and it would certainly be possible to carry goods from the Niger at Jebba to Lagos at £2 a ton. Every year the cost per ton mile is decreasing as the mileage and traffic increase.* Low rates could only be offered for full vehicle loads. At present the only large trade centre on the coast is Lagos. Forcados can never be anything but a transhipping port, as there is not enough ground for even a small town. At Lagos a number of enterprising European firms (English, German, and French) are established. As the Lagos Railway has been pushed into the interior the majority of these firms have opened branches further inland. A number are already established at Oshogbo, and as soon as the railway reaches Illorin they will open branches at that place. They are only waiting for the further extension to the Niger to extend their trade to that river. The Lagos Railway may be said to be practically constructed to Illorin, where it is only 56 miles from the Niger. A detailed survey of the railway trace to Jebba has been completed, and it has been found possible to construct a line with easy gradients not exceeding one in 80 to Jebba at a reasonable cost of about £6,000 a mile, *including liberal provision for rolling-stock and permanent station buildings.*

Careful surveys have been made for bridging the Niger at Jebba, and the former estimate of about £90,000 for this structure has been confirmed. The country between Jebba and Zungeru, near which place any railway to Kano must pass, has

* The steady decrease in cost of transport is well shown by the following figures of the average expenditure per 1,000 gross ton miles (General Manager's Report for 1906, p. 12):—1904-5, 670·42*d.*; 1905-6, 622·98*d.*; 1906, 565·63*d.*; and this decrease may be expected to continue.

been found even more easy for railway construction. Had it been possible to take our railway from Oshogbo to Pategi, near the mouth of the Kaduna River, and to cross the Niger there I should have favoured that route; so as to be able to make an earlier connection with the proposed Baro-Bida-Zaria-Kano line. With this view I had the country between Pategi and Oshogbo examined by the Chief Railway Surveyor, Mr. Brounger, from a railway-construction point of view, and by Mr. Birtwistle, our Commercial Intelligence Officer, as regards the traffic likely to be obtained. I have not yet seen the official reports of these gentlemen, but I have received information that the country is most difficult for railway construction. The cost of the line would therefore be great, independent of the much longer distance from Oshogbo to Pategi than from Illorin to Jebba—probably three times as great. Moreover, except for quite the first part of the line, the country is reported to be not more favourable for trade and traffic than the much-condemned tract of country between Illorin, Jebba, and Zungeru. The deviation, further, to the eastward to Baro would only increase the length and not run over an easier trace. The country, contrary to my anticipation, is thinly populated, and the stretch of line would certainly not receive remunerative local traffic, and, in view of the contemplated improvement of the Niger navigation, and its taking the bulk of the heavy traffic, at any rate during the wet season, I cannot advise an extension at present of the Lagos Railway in the direction of Baro. But I consider that the Lagos Railway should be linked up at once to the Northern Nigeria line, and I am prepared to ask the Legislative Council of Southern Nigeria to undertake the further construction of the line through Jebba to Zungeru to meet the proposed Baro-Kano line somewhere near that place. I recognise that for the present the local traffic from the country between Illorin and Zungeru is not likely to be remunerative, but from Mr. Birtwistle's and other reports, I think it probable that that traffic will develop quickly and that the construction of the railway will lead to a concentration of population near the line of the railway, and that the line will receive a considerable amount of traffic from Jebba. Cutting the Niger at Jebba will open up an entirely different part of Northern Nigeria, and if it is determined to rely on the Niger as far as Baro there is no object in taking the Lagos Railway to Baro. If the scheme for the improvement of the Niger River should prove successful it will be successful for all time, and the Lagos Railway taken to Baro, if the High Commissioner is correct, will receive but little traffic from the interior, but if it is taken to Jebba and onwards to Zungeru to join a railway to Kano in that direction it will run through a tract of country which will have to depend entirely on the railway for its transport, and is sure of constantly-increasing traffic from the north. Personally, I think that a direct line from Kano to Lagos, viâ Jebba, will take a very large amount of traffic. The enterprise of the Lagos merchants will lead them to open branches at Zaria and Kano at least, and they will have a very strong inducement to send their imports and exports viâ Lagos, where their principal branches of business are situated. Northern Nigeria has always looked to Lagos to supply its wants, and it is only in recent years that the advent of the Niger Company has lessened the dependence on Lagos. Even now, except at or near the river, Lagos goods are principally found, and Mr. Birtwistle reports that even at Bida a large proportion of the goods in the markets are of Lagos origin. The large capitalist may prefer to trade viâ the Niger, but the smaller merchant and the native traders will continue to trade with Lagos. And as far as rates of freight go I believe that the Lagos Railway with the advantage of the large commercial port at its terminus, and easy discharge and loading of steamers, will easily compete with the combined water and railroad transit viâ Forcados and Baro. As to time of construction, had authority been given last year the extension of the Lagos line could have been constructed as quickly as any line from Baro, and even now there would be very little difference. As to rates of carriage, it is not likely that the cheaper line from Baro, constructed at a cost of £3,000 a mile, would be able to carry goods at so low a rate as the Lagos line per ton mile.

In commenting upon the export trade of Nigeria, I note that the High Commissioner quotes the export trade of Southern Nigeria at less than £800,000 in 1906. He appears to have taken the figures from some report upon the trade of the old Lagos Colony only. The trade of Southern Nigeria is about £6,000,000, of which imports are about one-half, or nearly four times the amount quoted by Sir Percy Girouard. I agree that the prospects of traffic, when Zaria and Kano are reached,

are most favourable. The connection of these places with the river and coast by railway is essential. I quite understand the wish of the High Commissioner to have a large commercial town at Baro, but large commercial towns are not created in a day, and with difficulty in a decade.

At Lagos one already exists, and if the Southern Administration is allowed to prolong this line by the Jebba route to join the Northern Nigeria line at or near Zungeru, I believe that the attraction of the commercial centre now existing at Lagos will attract a considerable portion of the traffic of the hinterland.

In considering rates the possible minimum is actual cost of transport and not that cost plus interest on capital already expended. For the money is spent. The Southern Nigeria Government expects the railway to Illorin to earn the profit required to pay interest and sinking fund on cost of its construction, and it is probable that very soon that section will do this, but if the line is carried on to Kano and there is a competing route viâ the Niger the through rates will be fixed as low as possible—and that is only a little above actual cost of haulage.

WALTER EGERTON.

July 13, 1907.

No. 19.

COLONIAL OFFICE to TREASURY.

[*Answered by No.* 21.]

SIR, Downing Street, July 26, 1907.

WITH reference to the letter from this Department of the 10th of July,* and to the previous correspondence† noted in the margin on the subject of railway construction in Northern Nigeria, I am directed by the Earl of Elgin to request that you will lay before the Lords Commissioners of the Treasury the following statement of the conclusions at which he has arrived after considering Sir Percy Girouard's report,‡ and after a careful examination of the whole question at issue.

Colonial Office to Treasury, February 28, 1907.
Treasury to Colonial Office, March 30, 1907.
Colonial Office to Treasury, May 16, 1907.
Treasury to Colonial Office, June 11, 1907.

2. In the first place, I am to state that His Lordship is fully satisfied that the information which is now at his disposal, and which has been communicated to the Treasury, constitutes a complete statement of the arguments in favour of railway construction, based upon mature consideration of questions of policy, upon a survey of the country to be traversed, upon careful estimates of expenditure, and upon the expert opinion of the High Commissioner, as set forth in his report, after personal examination of the subject on the spot.

3. In the letter from the Treasury of the 30th of March,§ the Lords Commissioners pointed out that the project to which their sanction had been requested, viz., the construction of a "pioneer" line from Baro to Zungeru at an estimated cost of £375,000—was the first link in a system which was to be eventually extended to Kano, and that they could not sanction this first stage without finding themselves committed to the scheme as a whole, which would involve an expenditure of at least £1,200,000. Lord Elgin recognizes the force of this contention, and has in consequence come to the conclusion that it will be preferable to adopt at the outset the scheme as a whole, without, however, surrendering his liberty of action as regards the postponement of any portion of the construction if it should be thought desirable at a later stage.

4. Since the receipt of Sir Percy Girouard's report,‡ a telegram has been received from him in which he states that:—

(1) The cost of working of all construction traffic is included in the estimates;
(2) The local receipts in the first three years of construction should cover the expenditure on carriage of public goods, and the cost of organization of a nucleus station staff;
(3) The Government savings on the line reaching Zaria should amount to £10,000 a year;

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* No. 17. † Nos. 10, 12, 13, and 15. ‡ No. 16. § No. 12.

(4) When the line is open to Kano the Government savings should be £12,000 a year, and in the first year of working the local receipts should amount to £31,000. The cost of running one train a week (which would be sufficient at first) is estimated at £51,000, and of running four trains at £54,000;

(5) It should be possible to reduce the military expenditure of the Protectorate by £20,000 a year on completion of the construction of the railway.

5. Sir Percy Girouard's report has been communicated to Sir Walter Egerton, the Governor of Southern Nigeria, who is now in England on leave, and he has expressed his concurrence in the proposed railway from Baro to Zaria and Kano as a part of the railway policy of Nigeria as a whole.

6. I am now to ask that the Lords Commissioners may take the question of the provision of funds for the railway into their consideration at an early date, in order to avert the recurrence of the difficulties with regard to the necessity of Parliamentary discussion and sanction which arose when the project for the Baro-Zungeru section of the line was placed before the Treasury at the end of February last. I am to add that Sir Percy Girouard has represented that if construction is authorised, and if the delivery of rails and sleepers is to be expected in September, 1908, he should be allowed to undertake during the present financial year the commencement of earthworks and other necessary preliminary works, at an estimated cost of £60 000.

I am, &c.,
R. L. ANTROBUS.

No. 20.

CROWN AGENTS to COLONIAL OFFICE.

(Received July 30, 1907.)

[*Answered by No.* 30.]

Whitehall Gardens, London, S.W., July 29, 1907.

Nigerian Railways—Jebba-Zungeru Section.

SIR,

IN your letter of the 2nd October last,* you conveyed to us the Secretary of State's approval of a reconnaissance survey being made for a proposed line of railway between Jebba and Zungeru in Northern Nigeria.

2. I have now the honour to transmit, for the information of the Earl of Elgin, a copy of the report which we have received from the Consulting Engineers covering one by the Chief Surveyor, Mr. Brounger, from which it will be seen that the survey which has been made has shown that the construction of a line of railway with 1 in 80 grades and 15 chain curves over this route is practicable and easy and that it is provisionally estimated to cost £5,867 per mile or £721,580 in all.

I have, &c.,
E. E. BLAKE.

Enclosure in No. 20.

LAGOS RAILWAY EXTENSIONS.

JEBBA-ZUNGERU SURVEY.

REPORT by Messrs. Baker and Shelford.

(L. O. 689.)

July 24, 1907.

Lagos Railways Extensions.
Jebba-Zungeru Survey.

GENTLEMEN,

WE have the honour to forward herewith a report* prepared by Mr. Brounger, Engineer-in-Charge of Surveys, upon the reconnaissance survey carried out in January to April of this year, together with our own observations upon it.

* Not printed.

2. In accordance with your letter of the 5th October last, we forwarded instructions, through the Resident Engineer, to Mr. Brounger to make a reconnaissance survey with the object of determining the feasibility, character, and route of an extension of the Lagos Railway from Jebba to Zungeru or to such point in its neighbourhood as might be convenient for further extension towards Zaria and Kano and for connection with other railways in Northern Nigeria.

3. As the country was formerly practically unknown and was reputed to be difficult in parts, we made careful calculations of the extent to which expenditure in works or increase of length of both would be justifiable to obtain the gradient desired by Sir Walter Egerton. Fortunately, these have proved unnecessary, as Mr. Brounger, contrary to expectation, found the country to be so favourable as to permit of the construction of a direct line with a maximum gradient of 1 in 80 and moderate works.

4. Mr. Brounger's examination of the country does not permit of even an approximation to a detailed estimate, because the actual line, of which the feasibility with moderate works has been established, has, in some places, not been traversed, but by comparison with lines under construction its cost may be estimated at £5,460 per mile or £671,580 in all as follows:—

	Per mile.
Location and staking out with estimates	£120
Land and clearing	25
Earthworks	800
Bridges and culverts	381
Permanent way, 55 lbs. standard	2,895
Telegraph (three wires)	116
Plant, a total sum of £8,000, equal to	65
Stations and quarters, a total sum of £42,600, equal to ...	346
	4,748
Administration and engineering 15 per cent.	712
Total per mile	£5,460

(Or in all £671,580.)

5. To this should be added a sum of £50,000 for additional rolling stock called for by the extension, or a larger sum if the development of Northern Nigeria at the time when its construction is undertaken promises a considerable traffic.

6. For the purposes, therefore, of considering the general question of policy of railway construction in Northern Nigeria the cost of construction from Jebba to Zungeru may be taken as £721,580 or £5,867 per mile, this estimate being subject to revision upon a location survey.

7. We have, therefore, to recommend for consideration that the location survey, which was postponed in accordance with your letter, E./255/7, of the 4th March last, should be carried out during the next dry season so that the actual route of the railway may be determined and a more definite estimate of its cost may be prepared.

8. Mr. Brounger opportunely raises again the question of laying the permanent way in advance of earthworks and bridges which has, from time to time, had our careful consideration. In traversing forest country and soft ground, as in the earlier stages of West African Railway construction, it proved to be impracticable, although strenuous efforts were made to take advantage of the manifest assistance which such a means of communication would have afforded. With construction engines of a light type damage to the material can be avoided, when, as in this case apparently, the nature of the country permits of it. If the construction of this section is authorised, we should probably recommend the adoption of this procedure with modifications in detail, such as carrying out earthworks and ballasting where the work is light in advance of the track and limiting the amount of track laid on a temporary alignment to the sites of heavy earthworks, culverts, and bridges. We have, indeed, always laid down as a cardinal principle that works involving transport of heavy material should not be carried on in advance of the track and it is now a matter receiving our earnest consideration how far the transport of cement and pipes, recently by desire of the Government of Southern

Nigeria carried somewhat to excess to avoid temporary bridges, has been attended with economy either in time or money.

You will probably not desire further attention to be given to this matter at this stage.

We have, &c.,
BAKER AND SHELFORD.

To the Crown Agents for the Colonies,
Whitehall Gardens, S.W.

No. 21.

TREASURY to COLONIAL OFFICE.

(Received August 1, 1907.)

[*Answered by No.* 22.]

SIR, Treasury Chambers, August 1, 1907.

THE Lords Commissioners of His Majesty's Treasury have had before them Mr. Antrobus's letters of the 10th and 26th ultimo,* proposing to expend a sum of about £1,230,000 in constructing a pioneer line, 400 miles long, from Baro on the Niger through Zungeru and Zaria to Kano—the expenditure to be distributed as follows, viz., £500,000 before the end of 1909, £430,000 before the end of 1910, and the balance of £300,000 in 1911.

In reply I am to request you to inform the Earl of Elgin that, regard being had to the case of the Uganda Railway, and to the policy of His Majesty's Government against further borrowings on Imperial account, my Lords would be unable to sanction an Imperial loan for this purpose, notwithstanding the importance which they, in common with the Secretary of State, attach to the project.

On the other hand, their Lordships are aware that it is in contemplation to amalgamate Southern with Northern Nigeria eventually; and that the financial position of Southern Nigeria is so satisfactory that it is able to contribute £70,000 a year in aid of the deficiency of revenue in the Northern Protectorate. It may be therefore that, in order to ensure construction of the line, the Secretary of State may desire to utilise the credit of Southern Nigeria for the railway purposes of the Northern territory which it will eventually absorb. If so, my Lords will be glad to give their best consideration to any specific financial proposals which Lord Elgin may desire to put before them, even if such proposals involve a re-arrangement of the contribution made by Southern Nigeria in aid of the revenues of Northern Nigeria.

I am, &c.,
G. H. MURRAY.

No. 22.

COLONIAL OFFICE to TREASURY.

[*Answered by No.* 28.]

SIR, Downing Street, August 1, 1907.

I AM directed by the Earl of Elgin to acknowledge the receipt of your letter of the 1st of August,† setting forth the views of the Lords Commissioners of the Treasury on the proposals contained in the letter from this Department of the 26th of July‡ on the subject of railway construction in Northern Nigeria.

2. Lord Elgin concurs in the view that, as the amalgamation of Northern and Southern Nigeria has been decided upon in principle, and will probably be carried out within the next few years, it would be justifiable to utilise the credit of Southern Nigeria in order to ensure the construction of the railway, which, on amalgamation, will become the property of the Colony of "Nigeria" as a whole.

3. In the meanwhile, however, a very heavy charge would be thrown upon the finances of Southern Nigeria. Assuming that the loan would be raised in instalments to meet the requirements of successive years, and that the rate of interest would be 4 per cent., it is estimated that the charges on account of interest would

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* Nos. 17 and 19. † No. 21. ‡ No. 19.

amount to £20,000 a year up to the end of 1909, £37,000 to the end of 1910, and £49,200 in subsequent years, without taking into account any charge on account of sinking fund. Lord Elgin is of opinion that, although the financial situation of Southern Nigeria is satisfactory, the Colony could not reasonably be expected to incur this charge (with the consequent effect on credit) in addition to the large contribution, amounting to £70,000 in the present year, which is annually provided by Southern Nigeria in aid of the revenues of Northern Nigeria.

4. Lord Elgin would, therefore, suggest, for the consideration of the Lords Commissioners, that they should assent to an arrangement whereby the Colony should be relieved of the additional burden of the interest charges as they accrue from year to year, by remitting from the annual contribution a sum equal to whatever charge is incurred in any particular year in respect of this particular loan. As regards the sinking fund, His Lordship recognises the force of the argument advanced at the Conference of the 1st of August at this Office by the Financial Secretary to the Treasury, who pointed out that the debt should properly be regarded as the debt of the Colony of Nigeria as a whole, for the benefit of which the railway is to be constructed. The Secretary of State is, therefore, prepared to agree that the amounts remitted from the annual contribution should not include any charges on account of sinking fund.

5. I am further directed to observe that the existing conditions of the money market, which have had an influence in deciding their Lordships not to sanction an Imperial loan for the construction of this railway, will necessarily operate in an even greater degree, though possibly with less extended consequences in the case of a Colonial Loan. It would, therefore, be a matter for satisfaction to the Secretary of State if the Chancellor of the Exchequer were to find himself able to extend to Southern Nigeria similar facilities for borrowing as were recently agreed to in the case of Jamaica.

I am, &c.,
C. P. LUCAS.

No. 23.

COLONIAL OFFICE to SIR W. EGERTON.

[*Answered by Nos. 24 and 26.*]

SIR, Downing Street, August 1, 1907.

I AM directed by the Earl of Elgin to enclose, for your perusal, a copy of correspondence* between this Department and the Treasury, on the subject of railway construction in Northern Nigeria.

2. With regard to the last paragraph of the letter to the Treasury of the 1st instant,† I am to explain that it is understood that the Treasury are prepared to agree to the actual amounts required in each year for the payment of interest on the loan being advanced from accumulated balances in the hands of the Public Works Loan Commissioners.

3. His Lordship desires me further to inform you that the announcement of the decision authorising the construction of the Baro-Kano line shall be accompanied by a formal sanction to the extension of the Lagos Railway across the Niger at Jebba until connection has been established in the vicinity of Zungeru with the northern line.

4. I am to request that you will inform me by telegraph to-morrow whether you concur in the proposed arrangements.

I am, &c.,
C. STRACHEY.

No. 24.

SIR W. EGERTON to COLONIAL OFFICE.

(Received August 2, 1907.)

TELEGRAM.

I concur in arrangements, understanding that our construction will be allowed

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* Nos. 19, 21 and 22.

† No. 22.

to proceed with all possible speed to join other line; most important Shelford should have early authority to complete designs for ferry in consultation with Brounger.—EGERTON.

No. 25.

THE SECRETARY OF STATE TO THE HIGH COMMISSIONER OF NORTHERN NIGERIA.

SIR, Downing Street, August 2, 1907.

I HAVE the honour to acknowledge the receipt of your despatch of the 30th of May,* forwarding your report on the proposed transport policy for Nigeria which is now engaging the attention of His Majesty's Government, and in the meantime to transmit, for your information, a copy of the correspondence† noted in the margin between this Department and the Lords Commissioners of the Treasury on the subject of railway construction in Northern Nigeria.

Colonial Office to Treasury, 10th July.
Colonial Office to Treasury, 26th July.
Treasury to Colonial Office, 1st August.
Colonial Office to Treasury, 1st August.

I have, &c.,
ELGIN.

No. 26.

SIR W. EGERTON to COLONIAL OFFICE.

(Received August 7, 1907.)

SIR, Glenquiech, Kirriemuir, N.B., August 3, 1907.

REFERRING to Mr. Strachey's letter of the 1st instant‡ and my telegram to the Secretary of State, of yesterday, in reply which read as follows:—

"I concur in arrangements, understanding that our construction will be allowed to proceed with all possible speed to join either line. Most important Shelford should have early authority to complete designs for ferry in consultation with Brounger."

The arrangements now approved for railway extension to Zaria and Kano are most satisfactory and will, I feel sure, prove of very great advantage to both Administrations. I venture to congratulate the Secretary of State on the settlement of this much-vexed question of railway extension into the interior.

The sacrifice made by Southern Nigeria is the assistance given by it towards the establishment of communication with Baro and thus helping the establishment of a railway-cum-river route in competition with the Lagos-Kano line. I do not fear, however, the Lagos line obtaining a remunerative share of the traffic provided proper arrangements are made for crossing the Niger at Jebba without any handling of goods or change of carriages for passengers by a properly constructed ferry, to be replaced by a permanent bridge as soon as the latter structure can be erected. The ferry-boats will be of great use and economy during the construction period, and it is therefore important that their designs should be prepared and approved and order for their construction given as soon as possible. I should be very glad if this could be done before I leave England in October.

Work on the Illorin-Jebba-Zungeru extension should proceed from at least three, preferably four, points, *i.e.*:—

Illorin—Northwards;
Jebba—Southwards;
Jebba—Northwards;
Zungeru—Southwards;

and I think if the Consulting Engineers are at once given authority to proceed with the work, they might be able to send out consignments of tools to enable earthworks to be proceeded with in both directions from Jebba, and to even divert one or two shipments of permanent-way from the Illorin section to Jebba, before the Niger

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* No. 16. † Nos. 17, 19, 21, and 22. ‡ No. 23.

falls in October. I understand that so doing would not cause delay to the Illorin extension as the work is somewhat behindhand, and the rails taken could be replaced within a short time.

I would point out that it is most important that any arrangements made with Messrs. Elder, Dempster for freight of railway material up the Niger should include the taking of material to both Baro and Jebba. The river is equally navigable above and below Baro in the high-river season. It is only in the low-river season that the Baro-Jebba section is obstructed by shallows.

It is also important that houses for the construction staff should be sent out to Jebba during this high river, *e.g.*, before October. The designs used at Ibadan are suitable, provided provision is made for a proper air-space between the corrugated-iron roofing and the inner boarding—this is usually effected by placing battens 8 inches in thickness between the two.

Jebba has proved unhealthy in the past—I visited it last year in September and am not surprised, as I found it swarming with mosquitoes. One of the medical staff detailed for railway work should visit it and be given powers to insist on proper precautions being taken by both European and native inhabitants to prevent mosquitoes breeding in gutters, pits, pools, &c. I see no reason why it should not be made quite healthy.

The railway houses, however, should be properly mosquito-proofed in the method adopted in Lagos and for my house at Ibadan.

It is not quite clear from the correspondence how the money required by Southern Nigeria, in addition to that to be provided for the Baro-Kano line, is to be raised. I presume that either the Treasury will assist in financing the loan until the money market is in a more favourable condition or that the arrangements made *re* the Baro-Kano money will be no obstacle to the raising of the other monies required by Southern Nigeria. It will be remembered that it was found necessary to repay to the Treasury the £792,000 advanced on account of the cost of the Iddo-Ibadan line before a loan could be raised for further extension, and it is essential that no similar obstacle should be now created.

I have, &c.,
WALTER EGERTON,
Governor of Southern Nigeria (on leave).

No. 27.

RAILWAYS IN NIGERIA.

House of Commons, August 5, 1907.

In answer to Mr. Shackleton (Lancashire, N.E., Clitheroe),

MR. CHURCHILL said: "It has been decided to authorise the immediate construction of a pioneer railway of 3-feet 6-inches gauge, 400 miles long, from Baro, which is the highest convenient point on the perennially navigable reaches of the Niger, to Bida, by Zungeru, and thence to Zaria and Kano. The work of construction, which will occupy four years, will be begun under the general supervision of Sir Percy Girouard, whose experience in building the desert railway in the Sudan is well known. Full estimates, based on regular surveys, place the cost of such a line at £3,000 a mile, or £1,230,000 in all. In view of the fact that the amalgamation of Northern and Southern Nigeria is approved in principle, and will probably be accomplished in the next few years, the money will be raised as a loan by Southern Nigeria and will form part of the debt of that Colony. The rapidly expanding revenues of Southern Nigeria and its excellent financial position will, in the opinion of the Secretary of State, enable that Colony to assume this burden without embarrassment, and Sir Walter Egerton, the Governor of Southern Nigeria, fully concurs. But as an offset the Chancellor of the Exchequer has agreed that the annual contribution of £70,000 now exacted from Southern Nigeria in aid of the finances of Northern Nigeria shall be reduced in any year by a sum equal to whatever interest charge may in respect of this loan be defrayed by Southern Nigeria; and, further, in order that the Colony may obtain its money on the most favourable terms, the

Treasury have consented that the loan shall be made out of the Local Loans Fund, in the same way as the loan to Jamaica on account of the earthquake is to be made. His Majesty's Government have been led to this decision by three distinct sets of considerations. First, the enormous administrative and military difficulties of continuing to hold so great an extent of territory as Northern Nigeria without any central line of rapid communication; secondly, the obvious financial disadvantages of paying a grant-in-aid of nearly £300,000 a year for a province whose commercial development is completely arrested for want of such communication; and, thirdly, the immense importance of enabling British enterprise to reach the extensive cotton-growing areas of Northern Nigeria and thus vary and multiply the sources of the supply of so vital a raw material. I should add that the intention to construct the Baro-Kano Railway will in no way be allowed to arrest or delay the progress of the Lagos Railway, which will be steadily continued till it crosses the Niger at Jebba, and ultimately effects a junction with the northern line at, or in the neighbourhood of, Zungeru. It would not be possible to enter upon argument in answer to a question, but papers will be shortly laid before both Houses containing the fullest information both as regard policy and method."

No. 28.

TREASURY to COLONIAL OFFICE.

(Received August 8, 1907.)

[*Answered by No.* 29.]

SIR, Treasury Chambers, August 8, 1907.

THE Lords Commissioners of His Majesty's Treasury have had before them Mr. Lucas's letter of the 1st instant,* further on the subject of railway construction in Northern Nigeria.

The Earl of Elgin proposes that, as the amalgamation of Southern with Northern Nigeria has been decided upon in principle, the railway loan of £1,230,000 should be raised by Southern Nigeria; but that Southern Nigeria should be relieved of interest charges as they accrue from year to year on the loan by remitting from her annual contribution (at present £70,000 only) to Northern Nigeria a sum equal to whatever charge is incurred in any particular year in respect of interest on the loan; but that, as the railway will eventually become the property of the Colony of Nigeria as a whole, the amounts remitted from such annual contribution by Southern Nigeria shall not include any charges on account of the sinking fund for the eventual redemption of the loan.

In reply, I am to state that my Lords concur in these proposals, and that directions have been given (as requested in the last paragraph of the letter under reply) for introducing into the forthcoming Public Works Loan Bill a clause to enable Southern Nigeria to borrow the money from the Local Loans Fund on the lines applicable to the Jamaica loan of £800,000. When the Bill becomes law, it will become necessary in the first place that the Government of Southern Nigeria should duly provide for raising and securing the loan, before any advances can be made by this Board at the instance of the Secretary of State.

I am to add that the reduction of Southern Nigeria's contributions (as above) to Northern Nigeria is of course applicable only to the pre-amalgamation period. If their Lordships may assume that amalgamation will take place on completion of the railway to Kano, experience will have shown by that time what will be the increases of local revenue both in Northern and in Southern Nigeria, and what savings in expenditure can be effected by reason of the line both in transport and in military charges. Whilst it would be premature to anticipate now the results of such future experience, my Lords will ask Lord Elgin to consider in the meantime whether it may not be possible to reach financial equilibrium locally so far as regards the expenses of civil administration in the Colony of Nigeria, and so to restrict to

* No. 22.

military purposes alone the assistance that may be necessary after amalgamation from the British Exchequer.

I am, &c.,
WALTER RUNCIMAN.

No. 29.

COLONIAL OFFICE to TREASURY.

[*Answered by No.* 32.]

SIR, Downing Street, August 22, 1907.

I AM directed by the Earl of Elgin to acknowledge the receipt of your letter of the 8th of August,* from which he learned that the Lords Commissioners of the Treasury concurred in the proposal that the loan required for the construction of a railway from Baro to Kano, in Northern Nigeria, should be raised by Southern Nigeria, but that Southern Nigeria should be relieved of interest charges as they accrue from year to year on the loan by remitting from her annual contribution to Northern Nigeria a sum equal to whatever charge is incurred in any particular year in respect of interest on the loan. His Lordship learned further from your letter that directions had been given for introducing into the forthcoming Public Works Loan Bill a clause to enable Southern Nigeria to borrow the money from the Local Loans Fund on the lines applicable to the Jamaica loan of £800,000.

2. The loan from the Local Loans Fund would be a charge on the revenues and assets of Southern Nigeria ranking prior to any loan subsequently raised, and Lord Elgin is advised that this fact would seriously prejudice the credit of the Colony in raising in the open market the funds required for the extensive public works which have already been sanctioned and begun or are contemplated in the near future. This consideration has been brought to the notice of their Lordships informally, and, as the result of the discussion which has taken place, it is now proposed that Southern Nigeria should be permitted to borrow from time to time from the Local Loans Fund sums of money not exceeding in all £2,000,000, to be devoted to the construction of the Northern Nigeria Railway from Baro to Kano, to the extension of the Southern Nigeria Railway, the construction of harbour works, and other public works in Southern Nigeria.

3. It is understood that the sum of £2,000,000 will be available in such instalments as may be found necessary for the purpose of carrying on the various works, and that Southern Nigeria will be relieved, by means of a corresponding remission from her annual contribution to Northern Nigeria, of whatever charge is incurred in any particular year in respect of interest on the portion of the loan devoted to the construction of the Northern Nigeria Railway.

4. It is also, in Lord Elgin's opinion, essential that Southern Nigeria should be at liberty to pay off the whole or any part of the loan at any time on giving three months' notice to the Treasury. His Lordships regards this condition as indispensable in order to enable Southern Nigeria to take advantage of any opportunity which may present itself for recovering her full freedom for borrowing at favourable rates in the open market. It is presumed that, in the event of Southern Nigeria electing to repay the whole or any part of the loan, the repayment will take place at par, if Local Loans Stock stands at or below par at the time of repayment, but that, if the stock stands above par at the time, the repayment shall include the current premium on the stock. It will be remembered that this was the basis of repayment to which the Lords Commissioners of the Treasury felt bound to adhere, in the correspondence† noted in the margin in the case of the loan made from the Local Loans Fund to the Government of Lagos under the Colonial Loans Act, 1899.

To Treasury, October 31, 1902.
Treasury, November 24, 1902.
To Treasury, December 24, 1902.
To Treasury, July 23, 1903.
Treasury, August 7, 1903.
To Treasury, October 27, 1903.
Treasury, November 11, 1903.

5. I am to request that you will move their Lordships to give their formal sanction to these proposals.

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* No. 28.

† Not printed.

6. With reference to the last paragraph of your letter, Lord Elgin agrees that the amalgamation of Northern and Southern Nigeria must eventually be effected, and must be kept constantly in view in any arrangements of a comprehensive nature which may come up for consideration. But he is not prepared to commit himself even provisionally to any definite time at which it can take place. As their Lordships are aware, the difficulties to be faced in attempting to devise a scheme of amalgamation are great and numerous. The territories to be united form a vast area, over the greater part of which communication and transport will be difficult and slow even when the railways contemplated have been constructed. It is doubtful whether, until communications are very greatly improved, and departmental and provincial organisation is much more highly developed, it would be possible for a single Governor adequately to supervise the affairs of so vast a territory. The diversities of language, customs, and religion to be dealt with by a single Government will be greatly increased by amalgamation. The financial future, though hopeful, is obscure. It has still to be seen whether the remarkable expansion of the revenue of Southern Nigeria will continue, and whether the land and other taxes recently instituted in Northern Nigeria will fulfil the expectations of Sir F. Lugard, and not only fill the place of the abolished caravan tolls, but yield a still larger return in the future. While so many of the factors in the problem remain doubtful, Lord Elgin feels that it would be premature to assign any precise limit to the continuance of a dual system of Government, and he trusts that the Lords Commissioners of the Treasury will agree with him in this opinion. The suggestion made in the last sentence of your letter which appears to indicate an alteration in the methods of accounting rather than the administrative union of separate Governments will, in the meantime, be considered attentively.

I am, &c.,
H. W. JUST.

No. 30.

COLONIAL OFFICE to CROWN AGENTS.

GENTLEMEN, Downing Street, August 30, 1907.

WITH reference to your letter of the 29th of July,* I am directed by the Earl of Elgin to inform you that he has approved in principle of the extension of the Southern Nigeria Railway beyond Illorin, of its crossing the Niger at Jebba, and of its being connected at or near Zungeru with the line from Baro to Kano, which, as you will learn from a separate letter,† it has been decided to construct.

2. From the letters referred to it appears that the estimated cost of this extension for a line of the same type as the Southern Nigeria Railway is as follows:—

Illorin to Jebba	£391,000
Niger Bridge (about)	90,000
Jebba to Zungeru	721,600
	£1,202,600

But Lord Elgin is of opinion that it is *primâ facie* desirable to make the line beyond Illorin, or some part of it, of the "pioneer" type, the adoption of which has been approved for the line from Baro to Kano, and before approving of construction being definitely undertaken beyond that place he would be glad if you would furnish him with estimates showing the saving on the above estimated cost which would be effected by making of the "pioneer" type:—

(*a*) The whole extension from Illorin to Zungeru;
(*b*) The section between Jebba and Zungeru.

He would also be glad to be furnished with any observations which you and the Consulting Engineers may have to make as to any difficulties in working which might, in your opinion, result from making a change in the standard of construction at either of the points named, and with your remarks upon the subject generally.

3. Sir Walter Egerton has requested that designs for a ferry at Jebba, to be

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* No. 20. † Not printed.

replaced by a permanent bridge as soon as possible, may be prepared and approved, and that orders for the construction of the ferry boats may be given, if possible, before he leaves England in October. Lord Elgin has not yet received the separate report on the crossing of the Niger at Jebba, either by bridge or ferry, which is promised in your letter of the 29th of July.* It does not seem practicable to issue any definite instructions as to the steps to be taken in connection with the crossing until that report has been received and considered, and I am to request that it may be furnished as soon as possible.

4. I am to add that in the present condition of the money market the exigencies of finance will make it imperative that any works authorized in Southern Nigeria must proceed but slowly until the Colony is in a position to borrow money on fairly advantageous terms.

5. A separate letter will be addressed to you later as to the provision of funds for the extension beyond Illorin. In the meantime a separate account should, of course, be kept of all expenditure that may be undertaken in this connection.

I am, &c.,
H. W. JUST.

No. 31.

CROWN AGENTS to COLONIAL OFFICE.

(Received September 4, 1907.)

Whitehall Gardens, London, S.W., September 3, 1907.

Niger Transport.

SIR,

I HAVE the honour to transmit, for the information of the Earl of Elgin, copies of the report which we have now received from Mr. Shelford containing his views as to the improvement of the navigation of the Niger.

I am, &c.,
E. E. BLAKE.

Enclosure in No. 31.

REPORT ON THE RIVER NIGER. By FREDERIC SHELFORD, B.Sc. (Lond.), M.Inst.C.E.

(L.O. 714.)

August 27, 1907.

Report on River Niger.

GENTLEMEN,

IN accordance with the instructions contained in the Colonial Office letter, 21629/1907, enclosed in your E. 240/8, of the 25th ultimo, I have the honour to forward my report upon the River Niger dealing with the question of improving the waterway to such an extent as would enable it to be regarded as a reliable means of access to the Protectorate of Northern Nigeria.

2. As previously reported in my L.O. 619, dated 15th May last, I left Liverpool on March 16th with Sir Percy Girouard, K.C.M.G., the newly appointed High Commissioner of Northern Nigeria, and had the advantage of frequently discussing with him during the voyage the various schemes which have been put forward for facilitating transport in Nigeria by means of railways or improved waterways. Eventually, as the problem of the Niger Navigation seemed to me to be of very great interest, I arranged to comply with Sir Percy Girouard's request to accompany him up the Niger as far as Lokoja, although this was not part of my original programme. One important fact that weighed with me in deciding to adopt this

* Not printed.

course was that the Niger River had not previously been reported on or visited professionally by a consulting engineer from Westminster.

3. On the voyage to Lokoja we travelled on the T.S. "Corona," the High Commissioner's special shallow draught steamer, anchoring every night as soon as it became dark, except on one occasion in the delta when we steamed in the dark for some hours. Sir Percy Girouard and I had, therefore, the opportunity of seeing the whole of the river as far as Lokoja, and, considering that every part of the bed and the banks and islands of the river are constantly changing from year to year, it is doubtful whether much more information of a reliable character could have been obtained if months were spent in making a complete hydrographical survey of the river.

4. I took very copious notes and numerous photographs of the river during the time that we were travelling, and at all places where the navigation of the river was restricted by shoals or bars, causing the steamer to follow a sinuous course, I took soundings at intervals of 10 or 15 seconds until the bar was crossed. Distances were taken by time, and the direction of the ship's head was observed. Drawings accompany this report showing the longitudinal section of each of these bars between the ocean and Baro, with a plan of the route which the steamer followed in each case.

5. The time at my disposal did not permit me to proceed beyond Lokoja, and I therefore arranged, with the consent of the High Commissioner, for Captain Coulton Elliot, R.N.R., Marine Superintendent at Lokoja, to carry on similar observations as far as Baro. I further instructed Mr. Brounger, Engineer-in-Charge of Surveys of the Lagos Railway Extensions, who was at that time engaged in a reconnaissance survey between Jebba and Zungeru, to obtain similar information between Jebba and Baro. It will be remembered that Mr. W. Gee also examined the river as far as Jebba in the dry season of 1901-2. I am, therefore, in a position, by combining my own observations with those of others, to report with some knowledge of the river upon its more important features from the sea to Jebba, a distance of 420 miles, comprising the greater part of the length of the Niger which flows through British territory.

6. The remainder of the river from Jebba upwards past Say, Timbuctoo, Kulicoro (where the French railway from Kayes terminates), Couroussa (where the French railway from Konakry is to reach the river), to its source, is of little importance to the British territories. Much valuable information as to the upper part of the river flowing through French territory is given in Captain Lenfant's book "Le Niger."

7. I may refer briefly to the general features of the Niger River.

The source of the Niger is practically at the common boundary of the Colony of Sierra Leone, the Republic of Liberia, and the French Soudan, and describing a curve with a versed sine of 700 miles round the Ivory Coast, Gold Coast, Togoland, Dahomey, and Lagos, the river divides itself into a delta, commonly known as the "Oil Rivers," and finally reaches the Atlantic Ocean at a latitude of 4° N. The total length of the river may be estimated at 2,100 miles, of which 1,400 miles flow through French territory and 700 miles through British territory. The whole river lies between the parallels of latitude 4° N. and 17° N. Passing reference is all that space permits to the interesting "Niger Question" which puzzled geographers for so long, until in the year 1830 the problem was solved by the discovery by the intrepid explorers Richard and John Lander, who proved that the "Oil Rivers," which had been well known to traders for centuries, were really the mouths of the Niger River.

8. The Niger River is divided roughly into three sections by the natives, the upper portion being called the "Djoliba," extending from the source to Diafarabe, the middle portion, called the "Issa Ber," extending to Boremba, and the lower portion, called the "Kouarra," extending to the sea. The river may, however, for the purposes of this report be divided more conveniently according to the conditions of navigation prevailing in each section, and, regarding it in this manner, I find it naturally falls into six sections, of which the first three will not concern us further.

9. *Section I.*—From the source to Couroussa, the proposed termination of the Konakry Railway.

Section II.—From Couroussa past Kulicoro (the terminus of the Kayes Railway) and Timbuctoo to Asongo. This section is navigable.

Section III.—Asongo to Jebba, a portion of the Niger frequently interrupted by falls and rocks, culminating between Yelloua and Jebba in the "Boussa" Rapids where Mungo Park lost his life. This section is not navigable.

Section IV.—Jebba to Lokoja, a portion of the river navigable at high water, but only navigable at low river with considerable difficulty.

Section V.—Lokoja to Somabri, the "Main River" of the Niger which is dealt with in the following report.

Section VI.—The delta. To which may be added the "Mouths of the Niger."

10. I will deal with the last three sections of the river and its mouths in inverse order, in accordance with the usual engineering practice of dealing with a waterway from its outfall upwards.

11. *The Mouths of the Niger.*—The Niger finds its outlet in the sea by means of numerous mouths or entrances, of which the following are the principal:—

—	Depth of Water over Bar at L.W.O.S.T.	Remarks.
	Fathoms.	
1. *Benin* Entrance	1	Little used.
2. River *Escravos*	1	Unimportant.
3. *River Forcados*	3	Dealt with fully below.
4. River *Ramos*	2	Unimportant.
5. River *Dodo*	2¼	Unimportant.
6. River Pennington	2	Unimportant.
7. River Middleton	2	Unimportant.
8. Winstanley Outfalls ...	2¾	Unimportant.
9. Sengana Branch	1½	Unimportant.
10. *Nun Entrance*	1½	Unimportant.
11. Brass River	1¼	Leads nowhere.
12. St. Nicholas River ...	1	Unimportant.
13. Sta. Barbara River ...	—	Unimportant.
14. Sn. Bartholomew River ...	3 ?	Unimportant.
15. New Calabar River ...	1¼	Of local importance only. No through route to Niger.
16. Bonny River	3¼	
17. Opobo River	1¼	Unimportant.

Of all these mouths, that of the "Forcados River" is the most important, on account of its position as the navigable entrance nearest to Europe, the comparatively deep water over the bar, and the large area of deep water inside the harbour.

12. *Forcados River.*—The "Forcados River" sends a vast quantity of water to the sea, but it is important to note that only a small proportion of this water is provided by the Niger River.

Of all the great quantity of water which flows over the bar at Forcados the Niger River supplies only that amount which passes along the "Gana-Gana" branch of the Niger Delta, which forms the connecting link between Forcados and the Niger River, and is losing water at numerous points on its length where other creeks branch from it and flow towards the sea.

The main body of water flowing in and out over the bar at Forcados is altogether independent of the Niger, and flows actually to and from the Warri River, Chanomi Creek, and the other innumerable unexplored creeks which traverse the low-lying swamps in this district. The flow of water over the Forcados Bar, and the existence of Forcados Harbour itself, would be, in my opinion, only slightly affected if the Niger River did not exist.

13. The "Gana-Gana" branch of the Niger may, therefore, be regarded very much as a natural "canal" providing deep water navigation between the Niger main river at Somabri and Forcados Harbour.

14. I am anxious to emphasise what has, as far as I am aware, not previously been pointed out, that Forcados Harbour and the Niger River are practically independent, and are merely connected by one branch of the Niger out of many.

15. It is to this fact that Forcados Harbour owes its importance as an entrance to the Niger, because the Warri River and other creeks are capable of holding a vast volume of water which, flowing in and out with the tides, maintains deep water in Forcados Harbour itself, and comparatively deep water over the bar, and thus creates a deep water entrance to the River Niger, which has itself no deep entrances at all.

The amount of fresh water supplied by the Warri River, Chanomi, Charlton, Stuart, Dempster, Oduney, and Gana-Gana Creeks, and the tributary rivers flowing into them may be gauged by the fact that the ebb tide over the bar runs for 9 hours out of the 12½, and the flood tide only makes into the harbour for the remaining 3½ hours. The ebb sometimes runs out at 4 or 5 knots, and branch boats when foul are sometimes unable to enter against it.

16. *Forcados Harbour.*—The natural harbour of Forcados is of great extent, and is one of the best land-locked harbours on the West Coast of Africa. Its actual total area cannot be stated, owing to the large network of unexplored creeks which exist in all directions branching and re-uniting over a large area of country. The water available for anchorage inside Pigeon Beach and Goshawk Point, with a minimum depth of 30 feet of water at low-water spring tides, amounts to 2,490 acres, or 4 square miles, an area capable of affording anchorage to a considerable fleet.

17. This water is calm enough to permit the transhipment of cargo from the ocean steamers to the Lagos branch boats and *vice versâ* in the open water of the harbour, at a distance of about half a mile from the eastern shore. During tornadoes there is a roughish sea for small craft, but this is insufficient to affect steamers.

The stern-wheel steamers from the Niger after descending the river proceed from Burutu to Forcados, and come alongside of the ocean steamers at their usual anchorage to transfer passengers, luggage, and cargo.

18. Strong currents exist in the harbour, particularly on the ebb tide. Opposite the Warri Creek, near Warri Point, I measured a current of 5 knots on April 15th, 1907, and a current of 2 knots may be observed at the usual anchorage of the Elder Dempster steamers. These currents are not greater than those existing in Portsmouth Harbour, and are less than those in the Mersey, at Liverpool, and do not depreciate the value of Forcados Harbour as a first-rate anchorage.

19. One of the drawbacks to Forcados Harbour is the existence of low-lying swampy ground upon almost all its shores. It is due to this fact that the progress of Forcados has not been greater. The present settlement of Forcados is increasing at a considerable rate, and in April last new bank premises were in course of erection for Messrs. Elder, Dempster, and Company, and workshops of some size had been erected for the Nigerian Engineering and Dock Company, while numerous Government and mercantile buildings have also been built. The whole of the buildings on the shore of the harbour have, however, been erected on "made" ground. The foundations of buildings are usually prepared by spreading "chikoko" or blocks of mangrove roots and mud cut from the adjoining swamps, before commencing building operations.

Burutu, where the Niger Company have a very large depôt and the Government of Northern Nigeria a small station, has also been erected on made ground.

20. At Warri Point, however, on the north side of the harbour, there exists hard ground in conjunction with deep water close alongside. I visited this place on April 15th, but was unable to proceed as far as I wished to do, owing to the failure of the coal supply of the launch which was lent to me. It would be well worth while to examine this place more thoroughly than time permitted me to do, as it is possible that this point would be suitable for the construction of deep-water wharfage accommodation.

21. Forcados Harbour, like most natural harbours, contains shoal water, but this is so situated as not to affect the usefulness of the harbour as an anchorage. Within the above-mentioned area of 2,490 acres of water over 30 feet deep, the soundings show maximum depths up to 44 feet, and an area of 1,055 acres of water over which 35 feet of water is found at l.w.o.s.t. The harbour is, therefore, capable of accommodating inside the bar some of the largest ships in existence.

22. *Forcados Bar.*—The advantages of Forcados Harbour as a harbour of refuge or as a commercial harbour are greatly limited at present by the existence of the bar, which restricts the draught of ships entering Forcados Harbour to 18 feet 6 inches, or 19 feet under favourable circumstances.

The "Karina," drawing 18 feet 3 inches aft and 18 feet 5 inches forward, bumped heavily two or three times on her way over the bar on April 15th, and ships drawing the same amount have been known to be aground for some hours.

23. There is some discrepancy as to the amount of water on the Forcados Bar as shown on the latest charts and in actual practice. According to the charts the

most shoal water on the bar is 18 feet, and the tidal range is given at 5 feet, from which it may be assumed that at the top of a spring tide there will be 23 "feet of water" on the bar. The captains of the Elder Dempster steamers, however, consider that in actual practice not more than 19 feet 6 inches of water can be depended upon.

24. Judging from the charts, it would appear that the bar is fairly permanent in character, and should be capable of improvement.

On the north or windward side there is a long spit of sand about 4 miles long with heavy breakers and a depth of water varying from 7 to 17 feet at low water, and on the south or leeward side there is a sand spit about 8 miles in length with a depth of water varying from 10 to 18 feet, with breakers in bad weather.

25. These huge spits of sand are apparently fairly permanent, and act very much as training walls, converging the ebb water on to the bar, which is thus kept scoured to a depth of 18 to 23 feet (according to charts). If funds existed for the purpose of so gigantic an undertaking, the remedy for the Forcados Bar would be found in the construction of a mole on either side 4 and 8 miles in length respectively. The enormous length, however, of these moles, the deep water through which they would have to be constructed, the entire absence of stone or ballast in the district, and the unhealthiness of the climate, unfortunately places the consideration of any such undertaking out of the question.

26. There remains, however, the possibility of improving the depth of water over the Forcados Bar by dredging.

A longitudinal section* of the bar taken on April 15th is attached to this report.

From this it will be seen that the bar itself is not of great length, and the distance over which dredging would be required to obtain a depth of 20 feet of water at l.w.o.s.t. is 3,600 feet, or 1,200 yards only.

It is not possible without a careful survey, soundings, and observations to estimate the quantity of sand which would have to be dredged to remove the bar, but if the longitudinal section of the bar were the same as that shown, which cannot, of course, be depended upon, then the quantity of sand to be dredged over a width of 3,000 feet would be 1,500,000 cubic yards, a quantity sufficiently reasonable to justify the further consideration of the proposal.

I should consider that there would be more days available for dredging at Forcados Bar than at Lagos, because in calm weather the Forcados Bar is perfectly smooth, while on the Lagos Bar the swell never ceases.

If dredging were confined to the bar itself, the existing spits would continue to act as moles as at present, and the dredged channel should require but little maintenance.

27. The improvement of depth over the bar at Forcados, would, pending the improvement of the Lagos Bar, facilitate shipment to Lagos as well as to Northern Nigeria. The cargoes now carried by ocean steamers for Lagos are at present restricted owing to the want of water at Forcados, where, as you are aware, cargo is transhipped into branch boats.

28. *River Niger.—Section VI.*

A. *Navigation from Forcados to Burutu.*—Ocean steamers can be navigated to Burutu provided their draught is reduced to 16 feet.

Steamers at present discharge Lagos cargo into branch boats as already mentioned, and three or four days later proceed, with reduced draught, to Burutu (5 miles from Forcados), and discharge their cargo for Northern Nigeria.

The channel to Burutu is only navigable with some difficulty even on a reduced draught, and steamers are compelled to keep close to the eastern shore.

This shoal water is the result, as well as the evidence, of the feature I have already mentioned, viz., that the Forcados River supplies only a small proportion of the large quantity of water flowing over the Forcados Bar, causing the Burutu branch of the harbour to be so congested that comparatively deep water exists only near the eastern shore.

The shoaling of this channel may increase in the future owing to the phenomena at work at "Somabri Junction," as explained later in dealing with the navigation of the main river.

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* Not reproduced.

29. The remedy for this restricted navigation is, without doubt, dredging. A longitudinal section along the usual course followed by ships proceeding to Burutu accompanies this report, from which it will be seen that the amount of dredging required is not large, and would extend over two lengths of one mile each, with an average depth to be dredged of about 5 feet, and a small piece at Burutu.

The quantity of sand and silt which would have to be dredged to form a channel with a depth of 20 feet at l.w.o.s.t. and a width of 200 feet is estimated at approximately 400,000 cubic yards.

The depth dredged would probably require little maintenance, as there is nothing to induce much silting.

B. *Navigation from Burutu to the Main River.*

30. "*Gana-Gana Creek*" *(or Forcados River).*—Leaving Burutu on a stern wheeler one enters almost imperceptibly the branch of the Niger generally known as the "Forcados River" or "Gana-Gana Creek," which upon a map gives the impression of a small winding and unnavigable branch of the Niger, but upon inspection conveys more the idea of a large canal. The bank on either side is at first merely swamp covered by mangrove, or very low-lying ground, with an occasional village built some 2 or 3 feet above the water. As one progresses the banks become gradually higher until near Assaye they are some 15 to 20 feet high. They are usually perpendicular, and consist of loam. Vegetation on either side consists of low bushes with isolated trees of considerable height and numerous oil palms. The creek varies in width from 200 to 400 yards. As one travels further up the creek, it becomes less "canal" like, the banks increase in height, the creek increases in width, and is occasionally interspersed with islands. The banks are of a clayey loam, but on the inner sides of the bends considerable spits of sand begin to appear. These spits and islands are of bright clean sand. Long grass of a bright colour grows on their summits, where they are submerged only at high flood. The water is somewhat turbid, carrying a considerable quantity of sand, and flows at a rate of 1 to 1½ knots at low river.

31. On the "Gana-Gana" Creek there are few shallows, and, in fact, no obstruction to the navigation of shallow draught steamers, except snags, which have been removed to a great extent. This is evidenced by the fact that the stern wheelers are able to navigate this creek in the dark with little risk of accident. On my return journey down the Niger we travelled the whole of the night of April 13th leaving Assaye at 4 p.m., and reaching Burutu at 7 a.m. on the 14th. There would, therefore, be little required to be done to this creek to provide a permanent draught of 6 feet at low water. The few shoals which exist could be easily removed by dredging. The snags are now few, and can be removed by blasting.

The "Gana-Gana" Creek may, therefore, be regarded as a canal connecting Forcados Harbour with the Niger River, and requiring little improvement.

32. *Somabri Junction.*—It is doubtful whether Somabri village now exists. The name is apparently not known to the pilots; but, as a village called Somabri is marked upon the charts at this most interesting spot, and there is no other village in the immediate neighbourhood, I have called the place "Somabri Junction" for convenient reference. It is at this point that the main river of the Niger, which has throughout its course been augmented by tributaries flowing into it, now begins to split and divide itself amongst the innumerable branches and creeks which form a net-work over the whole of the delta of the Niger. This point is, therefore, of special interest, and the future behaviour of the river here appears to be of great importance to the navigation of the Niger.

33. At the date of our visit conditions prevailed which had been comparatively constant for some years past. The river at Somabri divides itself into two channels, one, the "Forcados River" or "Gana-Gana Creek," above described, and the other the "Akassa" branch. At the time of our visit the Akassa branch was considerably obstructed by a very large island which restricts the flow of water down the Akassa Creek, which is not regarded as navigable, and deflects it down the Forcados River, which is navigated daily.

The question which at once occurred to us was whether these conditions were permanent. Were, in fact, the conditions such that the main volume of water would continue to flow down the Gana-Gana Creek, or was it probable that the river would at an early date prefer the Akassa outlet?

34. This question is of great importance to Northern Nigeria. At present the larger part of the waters of the Niger is being deflected down the "Gana-Gana" Creek, thus not only keeping it fresh and pleasant to navigate, but also by its scour maintaining in the creek a deep channel with few shoals or islands.

This statement must not be considered as conflicting with the remark that I have previously made that the "Gana-Gana" Creek supplies little of the outflow over the Forcados Bar for throughout its course down to the limit of perceptible tide, the "Gana-Gana" Creek is losing water through the innumerable small creeks which are constantly branching from it on its southern side, and reach the sea by the numerous minor outlets along the coast.

35. If, however, the conditions at the "junction" were to change, and the greater quantity of water were to travel down the "Akassa" branch, there can be little doubt that this would lead to a deterioration of the navigability of the "Gana-Gana" Creek, and consequent loss to the Government of Northern Nigeria, the Niger Company and other traders who have established factories along the creek and large depôts at Burutu and Forcados.

36. There is strong evidence that this change of channel is likely to take place in the near future, unless steps are taken to combat the forces of nature.

The recent history of the river can be read like an open book by anyone accustomed to study the movements of rivers.

37. A sketch plan* of the river at the "junction" is appended to this report and requires but little explanation to elucidate it. The Niger River has for some years been following the loop A B C scouring the bank D and forming the shoal E. In course of time the distance A B C has become too great for the difference of level between A and C. Consequently, after the flood of some recent year, the river, in falling, proceeded to cut a new and more direct channel A C through the bank which it had itself formed at E. This year after the flood in September the river, in falling, will probably take the channel A C in preference to the old channel A B C. This does not necessarily mean that the channel A B C will cease to exist, but it is a question after September next whether the route for navigation will not be A C rather than A B C. If this does not occur this year, it will probably not be long delayed. Instances of the same kind occur the whole distance up the Niger River. Frequently Mr. Wallace, who was with us, or the captain of the ship would point out, when the steamer was travelling close to the western bank of the Niger, that two or three years ago the channel used to be upon the opposite side. If, as is probable, the river shortly shows a preference for the channel A C, rather than that marked A B C, the effect at the junction will be marked, for the main body of water, instead of being deflected gradually as at present by the bank D F down the Gana-Gana Creek, will be directed towards the Akassa Creek.

38. Such a phenomenon is the usual process at similar points, and is the means by which the water can be divided between two channels, the greater part sometimes going down the one channel and sometimes down the other, oscillating from channel to channel in accordance with the direction in which the main current reaches it.

39. In this case the water has for some years past reached this point in a direction most suitable for following the "Gana-Gana" Creek, but in the near future it is likely, owing to the cutting of the new channel above referred to, to come down in a direction more suitable for following the Akassa Creek to the sea, and leaving the "Gana-Gana" Creek as a mere overflow.

40. It is only by artificial means that it is possible to avoid this swing of the pendulum which would be detrimental to the Protectorate of Northern Nigeria. The mouth of the Akassa Creek is at present an opening some 200 yards to 300 yards in width lying between the eastern bank and the large island above referred to. This island would be rapidly scoured away, and the mouth of the Akassa Creek much enlarged if the direction in which the main stream of the Niger impinges upon it be altered, as seems probable.

This tendency on the part of the river could be combated by the construction of an artificial dam of trees with their branches interwoven with wire ropes across the present mouth of the Akassa Creek. Whether by any such means the main stream at low water could be kept permanently directed down the Gana-Gana Creek is a question which requires careful study on the spot. Such a dam would probably

* Not reproduced.

be effective during low river, but in high river it might be swept away and the whole work lost.

41. This point requires special study in detail on the spot, and I beg to associate myself with the recommendation, which I believe is to be made by Sir Percy Girouard, that an engineer with suitable experience should be appointed to consider this question at an early date.

42. *Section V. of the Niger River (The "Main River").*

Navigation from Somabri to Baro.—Above Somabri we have to deal with the main river of the Niger fed throughout its course by tributaries of various sizes, from the Benué and Kaduna Rivers to the smallest streamlets.

The most remarkable features of the main river of the Niger are:—

First. The remarkably straight course which characterises the river from Lokoja to Somabri, a distance of about 180 miles.

Second. The uniformity of the velocity of the water.

Third. The great width of the river even at low water.

Fourth. The complete absence of rock.

43. The river from Lokoja to the sea has nearly approached its limit of erosion, and is, therefore, free from falls and rapids, which are not encountered until above Jebba, at a distance of about 450 miles from the sea.

44. The water in the main river, even at its lowest, is from 1,000 to 1,500 yards in width, where not interrupted by islands. The water is turbid and heavily charged with sand, a sample taken in a bottle showing a considerable deposit after standing for a few hours. The velocity of the Niger, except over the bars, is fairly uniform at low river, averaging about 1·8 miles an hour.

45. The banks of the river are fairly uniform, those on the lower part of the river being from 20 to 30 feet high, and consisting of loam, with an almost vertical face.

46. The vegetation on the banks consists of low bush with tall trees at intervals and, in the lower parts of the river, oil palms in profusion, decreasing in number as one travels up the river.

47. The villages on the banks are infrequent and are only to be found on the higher spurs of the banks. The Niger, when in flood, generally extends far beyond its low river boundaries, frequently covering the adjoining country to a depth of a few feet for some miles back and thus rendering the banks themselves uninhabitable, except where high ground occurs.

48. The actual width of the Niger itself between the delta and Lokoja averages approximately 1½ to 2 miles, the actual banks being indicated by the large forest trees which would not bear submersion for long. Between these boundaries the Niger finds its way at low river, its course interrupted throughout almost its entire length, either by spits running into the river on either side, or by islands or shoals narrowing the width of waterway. Most of the islands are of a bright coloured sand with long reed grass growing on their higher parts. Such islands can only be regarded as temporary, probably existing for one season only, and are subject to alteration in shape during every flood.

49. There are, however, also certain more or less permanent islands, such as the Bullock Islands, Long Island, Arka Island, and Selim Island, which are characterised by the existence of oil palms or tall forest trees growing upon them. Such islands, of course, are only comparatively permanent, but have, from the evidence of the trees growing upon them, existed for 10, 20, or even a greater number of years. They are not, however, really any more permanent than the banks of the river itself. For instance, Long Island has recently been cut in halves and tends to disappear, while Arka Island has lost much of its length since the most recent maps were prepared.

50. The conditions, therefore, found between the delta and Lokoja are those common to any natural river which has reached, or almost reached, its bed of erosion.

The quantity of water flowing down the Niger at low river is very great. From a cross section taken by Captain Elliot near Lokoja and the velocities observed by myself when on the river, the dry river flow of the Niger may be estimated at about 56,160 cubic feet per second near Lokoja.

51. The discharge at high river is estimated at 220,000 cubic feet per second from information received from Captain Elliot.

52. The low river flow, large as it is, finds a channel (created at high river) which is much in excess of its requirements, with the result that the channel between the banks is largely filled with islands or spits extending from one shore or the other. Such conditions are usual in all rivers when left to themselves, and it is necessary to consider whether any steps can be taken to improve navigation under the conditions that prevail during low river, *i.e.*, from November to June, or 8 months out of 12.

53. The river commences to rise in the middle of June, when the first rains have fallen within its watershed, and rising with an increasing rapidity it reaches the maximum height of from 22 to 35 feet at Lokoja about the end of September, when, owing to the cessation of rains at the end of July, the river commences to fall rapidly until at the end of November the low river season once more sets in.

54. Navigation of the river at high water requires only an intimate knowledge of the river itself, but at or about low river the Niger from the delta to Lokoja, although still a fine river, is much interrupted by the islands, shoals, and sand spits. For by far the greater distance over this length a stern wheel steamer drawing 3 or 4 feet of water has no difficulty in steaming over most of the river's width. Occasionally, however, the steamer encounters a "bar" or "crossing," where navigation is restricted to a narrow and tortuous channel.

It is remarkable how few of these bars exist as is shown by reference to the longitudinal sections which accompany this report.

Sections are given of 28 bars in all, but some of these, close together, are taken as one bar only. (See drawings.)

55. The opinion of the Niger pilots is that, except in very exceptional seasons, there is 4 feet of water over any of these bars. The difficulty is to find the channel which has that depth of water in it.

The navigation of the stern wheel steamers is now done partly by memory and partly by eye by the native pilots, who, by watching the surface of the water can tell by the eddies where the water is deep and where the main stream lies. In ascending the river they take care to steam against the main current, and in descending they endeavour to follow the main current through all its sinuosities. As a general rule, even in the lowest river, the pilots are successful in finding the deepest water over all the crossings. Occasionally, however, as happened upon my return upon the S.W. "Sarota," the pilot makes a mistake and grounds the steamer, and it is a matter of some hours, and occasionally of some days, before the steamer can be re-floated.

56. The cause of these bars is apparent. Where the main channel of the river meanders round spits of sand jutting out from either shore, navigation is easy, for deep water is to be found on the outer side of every bend, frequently close to the bank. At some places, however, particularly in the straighter portions of the low river, where there are no such bends, the necessary reduction of the waterway is produced by shoal water instead of by spits.

57. On almost any of these bars it will be found that there is more than one channel through which the water is passing. Probably there will be five or six channels over one bar, of which one is deeper than the rest and the question of improving navigation may be reduced to the problem whether it is possible to induce one of these channels to be the deep water channel over that particular bar, and to remain so for the season.

58. The bars are constantly shifting in position. A bar found near a certain village during one season may have entirely disappeared in the next, while where there is deep water in one season a bar is found in the next.

59. It is a question therefore whether, as the flood passes away, some artificial assistance can be given to the river in defining the channel which shall form the navigable course for steamers during the following 6 or 8 months of low river.

60. At each of these bars the river wastes itself by forming two, four, six, or even more channels instead of forming one. If one channel could be assisted to become the deep channel, the others would tend to silt up. It is probable that valuable assistance in this respect could be afforded by a shallow-draught dredger working as the river falls.

61. During high river such a dredger could be hauled up and prepared for the next season's work. During October and November the river would, owing to local conditions, decide for itself, so to speak, where bars were to exist for the following season. When the position of the bars had been determined, the dredger

could proceed up river. On reaching the first bar, by the examination of local conditions, it could probably soon be decided which channel was most likely to be permanent during the coming low river season. The dredger could be put to work on this channel, rapidly excavating the sand, which is very "lively" and amenable to dredging, and in the course of 2 or 3 days should form a channel through that particular bar. The dredger could be arranged to deposit the excavated sand by pipe lines upon the competitive channels which it would be desirable to block up.

The dredged channel would be defined by buoys, and the dredger could pass on to the next bar and deal with that in the same way.

62. The longitudinal sections accompanying this report show that not only are the bars few in number, but the amount of dredging required at each is small. The total volume to be dredged to obtain a width of 200 feet, which would be more than ample, and a depth at low river of six feet, amounts to about 900,000 cubic yards, a quantity which cannot be regarded as very large.

63. This work, however, to be of any use would have to be done in two months. If two dredgers were employed capable of raising 1,000 cubic yards of sand per hour, about 450 hours of actual work would suffice to clear the channels over the bars between the delta and Baro. Allowing for steaming from bar to bar one could probably not calculate upon more than 10 working hours per day for each boat, so that six or seven weeks of work on the part of two dredgers might form a navigable channel over all the bars by the middle or end of January, prior to which navigation is comparatively easy.

64. It may be considered whether it would be possible to render these dredged channels more or less permanent by constructing spurs over the shoal water on either side of the dredged channel. This would require study on the spot in each case. If at any given point practically the same bar was found to exist season after season the construction of such spurs might be effective, but at places where the bars exist only for a single season it would not be worth while to construct them. The spurs I have in mind are similar to those in use in India, and described by Mr. Tufnell in a paper on "Economical River Training in India." Such spurs would consist of trees cut from the neighbouring forest and sunk at desired spots.

65. Apart, however, from this, it would probably be found that some of the channels had been wrongly chosen or had silted up, and that as the river fell further the dredged channel would have a competitor in another channel at a spot more suited to local conditions. In such a case the dredger would have to return and deal with the problem by assisting the most favourable channel and blocking its competitor.

66. Probably the whole of the results of the above work would disappear when the following flood arrived, bringing into action forces of nature so stupendous that no efforts of man in such a climate could prevail. The whole work would therefore have to be re-done during the following season, so that to attempt to provide free all-the-year-round navigation for vessels drawing six feet of water would require the maintenance and working of two suction dredgers at a cost of £4,000 to £5,000 per annum each, or a total of £8,000 to £10,000 per annum for the two, including depreciation.

67. The permanent improvement of the Niger for navigation can be set aside as out of the question. The river from Baro to the delta might as a matter of fact lend itself to an artificial reproduction of the conditions to which the river could accommodate itself, viz., the construction of two training walls throughout practically its entire length which, if placed at a suitable distance apart, would maintain a sufficiency of scour to provide good navigation at low river. No such undertaking can be even discussed.

68. One is therefore compelled to deal with the question temporarily and to point out what steps might be taken to attempt to overcome the present existing obstructions to navigation during the four or five months of the year when traffic is likely to be awaiting transport.

The dredging proposition which I have ventured to set forth above cannot be regarded otherwise than as entirely experimental. The experiment, however, from the importance of the results to Northern Nigeria seems to be well worth trying.

69. Much depends upon the importance of the Niger River as giving access to Northern Nigeria. The river affords the natural means of communication between Northern Nigeria and the sea, through the large extent of low-lying and densely-

forested country which intervenes, and it is therefore essential that consideration should be given to the problem of improving navigation of the river.

70. The means by which such improvement might be attempted are described above. No complete success can, however, be predicted. There is, however, a reasonable probability that the employment of a dredger as described above might remove some of the lower bars in the first season, and thus obtain partial success; such partial success in one season would probably lead to complete success with two dredgers in the next.

71. It appears to me that such an experiment might be tried, and possibly in return for the cost of two dredgers the navigation of the river might be improved to an extent which would permit the passage of boats drawing six feet of water at all times of the year.

72. The volume of future trade from Northern Nigeria is at present so hypothetical that no reliable estimates can be formed of the saving in freight per ton of exports which could be set against the cost of dredging. It is, however, to be noticed that the cost of dredging would increase but slightly with a very large increase of traffic.

73. At present, the maximum draught with which a steamer can navigate the Niger at low river is about three feet nine inches. This is a small draught, but on the other hand it must be remembered that there is no limit to the number of boats which can navigate the river on this draught, so that practically any quantity of future exports could be carried down the Niger as it is, if there were sufficient boats.

At present the rate charged for cargo down river is, I am informed, 35s. per ton, but the boats only carry 100 to 120 tons of cargo.

An increase of draught in these boats by two feet would mean an increase of cargo of about 120 tons. If the boats, however, were at the same time made longer and broader, their capacity could be brought up to 500 tons.

The rate on cargo could be brought down to, say, 15s. per ton, approximately, if the capacity of the boats were increased to 500 tons, or a reduction of rate of 20s. per ton.

74. It would therefore require an export of, say, 5,000 tons to pay for the upkeep of one dredger and 10,000 tons to make two dredgers remunerative.

If the prospects of Northern Nigeria as a cotton-growing country are likely to be realised, these figures are of course insignificant.

Therefore the increase of maximum draught of steamers navigating the Niger by two feet would be remunerative if the exports of Northern Nigeria become at all important.

75. The question remains whether the employment of two dredgers as described above would obtain the desired increase of draught.

It is unfortunately impossible to guarantee that this will be the case.

76. It is obvious that the successful treatment of all the bars but one would be a waste of effort, for the obstruction caused by one bar unsuccessfully treated would be as effective as if the river had been left alone. To forecast that each and every bar could be successfully treated in any one season is out of the question. The conditions prevailing are different in each case, and the work of dredging would have to be applied with great intelligence to obtain the best results.

In any case the results will always be doubtful until experience of each bar has been obtained, and this will be difficult on account of the constant changes in the position of the bars.

77. The most that can be recommended is a trial of a method which may fail, but which, if successful, would well repay the cost.

78. For this purpose one suitable dredger might first be tried, working under the supervision of an engineer fully qualified to deal with the problem presented by each bar and under the command of a man accustomed to such work. If such a dredger met with success in the first season, she could be supplemented by another the next year, which would benefit by the experience of the first boat.

79. This report has dealt with the problem of effecting an important improvement of the Niger navigation, but I may mention that the removal of snags, which are not numerous, should be continued, and the channels over the bars should be buoyed. The latter would not be costly, but river pilots usually offer passive resistance to a course which might decrease the demand for their services.

80. I have not attempted to deal at this stage with the establishment of a Niger river service, by which the river would be divided up into sections, each

section being under the charge of a responsible engineer. If success attended the efforts of the first dredger such an organisation should be arranged and should ensure the desired improvement.

81. It may be considered that the consideration of a problem of this nature is incomplete without a hydrographic survey of the river. I should like to take the opportunity of recording my opinion, which I know is shared by Sir Percy Girouard, that a hydrographic survey of the Niger would be a waste of money. The work would be very expensive both in money and in lives, and the result would be practically useless. The Niger River, like other untrained rivers, is not in the same condition for more than a few months at a time, so that by the time such a survey was completed it would be difficult to follow it owing to the rapidity of the changes of banks, spits, islands, and deep-water channels which are occurring with each flood.

82. *Conclusions.*—I have therefore to submit the following conclusions:—

(1) The Forcados Bar lends itself to dredging, and an improvement of the depth of water over this bar would be of benefit to Northern Nigeria, and, pending the improvement of the Lagos Bar, to Lagos also.
(2) Forcados Harbour with an improved bar would become one of the best harbours on the West Coast of Africa.
(3) The channel from Forcados to Burutu could be readily improved by dredging, and this would be of benefit to the Government of Northern Nigeria and to the Niger Company.
(4) The "Gana-Gana" Creek requires little improvement and such improvement as is required could be obtained by dredging.
(5) The conditions under which the distribution of water at Somabri Junction may be subject to injurious alteration require study by a suitable engineer at an early date.
(6) An experiment might be made to improve the navigation of the Niger between Somabri and Baro by the employment of a suitable dredger under the supervision of a qualified engineer, and in the event of success with the first dredger, a second dredger should be employed and an effort made to obtain a minimum draught of six feet as far as Baro.
(7) If the operations of the dredgers proved that the navigation could be improved, a Niger River service should be organised.

83. The following drawings* accompany this report:—

1. Longitudinal section of Forcados Bar.
2. Longitudinal section of route followed by steamers from Forcados to Burutu.
3. Sketch plan of Somabri junction.
4. Longitudinal sections of bars and plans of deep-water channels.

I have, &c.,
F. SHELFORD.

To the Crown Agents for the Colonies,
Whitehall Gardens, S.W.

No. 32.

TREASURY to COLONIAL OFFICE.

(Received September 13, 1907.)

[*Answered by No.* 38.]

SIR, Treasury Chambers, September 12, 1907.

I HAVE laid before the Lords Commissioners of His Majesty's Treasury Mr. Just's letter of the 22nd ultimo,† further respecting the construction of a railway

* Not reproduced. † No. 29.

from Baro to Kano in Northern Nigeria; and I am to request that you will submit to the Earl of Elgin the following reply.

2. As his Lordship will be aware, my Lords have now been empowered by the Public Works Loans Act of last session to advance from time to time to the Government of Southern Nigeria from the Local Loans Fund sums not exceeding in all £2,000,000, in accordance with the proposal set out in paragraph 2 of Mr. Just's letter.

3. I am, however, to remind the Secretary of State that it was agreed in recent discussions that the Government of Southern Nigeria should undertake to spend £1,230,000 out of this total on the construction (and completion) of the Kano line. Accordingly the sums to be devoted to other purposes must not exceed the balance of £770,000.

4. Their Lordships would further observe that the purposes to which the loan may be applied are defined by the Act as "constructing and improving railway and other communication in Southern and Northern Nigeria," and that nothing outside this definition can be admitted.

5. It is agreed that Southern Nigeria will be relieved, by means of a corresponding remission from her annual contribution to Northern Nigeria, of whatever charge is *payable* in any particular year in respect of interest on the portion of the loan devoted to the construction of the Northern Nigeria Railway. But my Lords must not be understood, in making this concession, and in throwing the interest charge on to the Imperial Grant-in-Aid, to treat the existing Southern Nigeria contribution as the equitable measure of the assistance which in 1908-9, and in future years, that Colony ought to extend to the Protectorate of Northern Nigeria pending amalgamation.

6. With regard to the question of repayment, my Lords recognise the force of the reasons which make the Government of Southern Nigeria desire to have power to pay off the outstanding balance of the loan at brief notice, and they will be prepared to facilitate that object so far as can be done without detriment to the Local Loans Fund. At the present stage of the transaction, my Lords are unable to commit themselves unconditionally to the acceptance of repayment at par whenever the price of Local Loans Stock is not above par. The conditions that will be fair to the Local Loans Fund must depend to some extent on the manner in which money is raised for the purpose of making the loan. If it were necessary to make a special issue of Local Loans stock for that purpose at a price of about 94 or 95, it would be clearly disadvantageous to the fund to be obliged to accept repayment at par a few years later, if there were no means of employing the money repaid except in the purchase of stock for cancellation at a price (say) of 99 or 100.

7. If, however, the loan is advanced by instalments spread over several years, there may be no necessity for a special issue of stock on this account. Again, it may happen that, when the Government of Southern Nigeria desires to repay, there may be an active demand for loans out of the Local Loans Fund, so that the money repaid to the fund can be employed in making fresh advances without loss. As it is not possible now to foresee these conditions, it will probably be better to defer the settlement of precise terms for repayment until the question arises in practice; but the Government of the Colony may rest assured that the Treasury will have every disposition to facilitate the early repayment of the loan without imposing unduly onerous terms as regards either the period of notice to be given or the price to be paid.

8. As regards the mode of issue of the loan, I am to state that it will be convenient if estimates can be furnished half-yearly of the amount of the advances likely to be required during the ensuing six months. Instalments of the loan will then be advanced from time to time as required. As provided in the Schedule to the Act, the loan may be repaid either by equal instalments of principal or by constant annuity. If the latter method be decided upon, a single annuity may be calculated to repay all the instalments advanced in any one year.

I am, &c.,
ROBERT CHALMERS.

No. 33.

THE SECRETARY OF STATE to SIR W. EGERTON.

(Sent 5.47 p.m., October 22, 1907.)

TELEGRAM.

I agree to railway extension to Zungeru as soon as possible. Section beyond Jebba to be pioneer and ferry across Niger. Crown Agents can provide funds for Southern Nigeria and Northern Nigeria railways until loan question settled probably early next year. Request you will send home draft legislation necessary for borrowing either from Treasury or open market.—ELGIN.

No. 34.

COLONIAL OFFICE to CROWN AGENTS.

[*Answered by No.* 35.]

GENTLEMEN, Downing Street, October 25, 1907.

I AM directed by the Earl of Elgin to inform you that he has agreed:—

(1) That the Lagos Railway shall be extended as soon as possible to join the Baro-Kano Railway at or near Zungeru.

(2) That the section of the railway from Illorin to Jebba shall be of the same type as the rest of the line from Lagos, and the section from Jebba to Zungeru of the "pioneer" type, similar to the Baro-Kano line.

(3) That the Niger shall be crossed by means of a ferry at Jebba.

2. Sir Walter Egerton and Sir Percy Girouard have been informed of this decision.

I am, &c.,
R. L. ANTROBUS.

No. 35.

CROWN AGENTS to COLONIAL OFFICE.

(Received November 9, 1907.)

Whitehall Gardens, London, S.W., November 8, 1907.

Lagos Railway Construction: Oshogbo-Zungeru Section.

SIR,

I HAVE the honour to acknowledge the receipt of your letter of the 25th of October,* conveying the Secretary of State's approval of the extension of the Lagos Railway to join the Baro-Kano Railway at or near Zungeru, and conveying instructions as to the types of railway to be adopted for the Ilorin-Jebba and Jebba-Zungeru sections, respectively.

2. We communicated your letter to the Consulting Engineers, and I transmit, for the Secretary of State's information, a copy of their reply. Messrs. Baker and Shelford appear to have correctly understood the Secretary of State's instructions.

I have, &c.,
E. E. BLAKE.

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* No. 34.

Enclosure in No. 35.

(L.O. 853.)

November 1, 1907.

Southern Nigeria.

Lagos Railway: Oshogbo-Zungeru Section.

GENTLEMEN,

WE have the honour to acknowledge your E/366/1, of the 30th October, 1907, and to report that we are taking steps to proceed at once with the construction of the Ilorin-Jebba and Jebba-Zungeru section of the Lagos Railway, with a ferry at Jebba, which, with the section Oshogbo-Ilorin already under construction, will complete the railway from its present terminus at Oshogbo to Zungeru.

2. We note that the section from Ilorin to Jebba is to be of the same type as the rest of the line from Lagos, by which we understand that the standard of construction is to be that of the extensions now constructing and not that of the original Iddo-Ibadan section, which differs in some respects from the Ibadan-Ilorin section.

3. We also note that the section from Jebba to Zungeru is to be of the pioneer type similar to the Baro-Kano line. The differences between this type, put forward by us under that name early this year for the Baro-Kano line, and adopted after detailed discussion with Sir Percy Girouard in March last, and the Lagos standard, are set out in detail in our letter L.O. 751, of the 19th ultimo,* and it appears to us that the decision of the Secretary of State implies the adoption of the proposals contained in that letter.

4. We may perhaps be permitted to recapitulate the proposals referred to:—

(*a*) The use of a lighter rail and sleeper.
(*b*) The substitution of steel trestles for bridges of concrete and steel girders, and of corrugated iron pipes for earthenware or concrete pipes or culverts.
(*c*) Cuttings taken out to the minimum width and requiring to be widened or sloped back before the railway can be economically maintained.
(*d*) Stations reduced in number to the minimum required for working the trains, and below what may be required for attracting and booking traffic.
(*e*) Accommodation at the stations actually provided to be reduced to the minimum.
(*f*) The provision of only one telegraph wire on a very light type of pole.
(*g*) Provision of the minimum quantity of ballast
(*h*) Provision of a minimum quantity of rolling stock.

5. We desire, however, to draw your attention to paragraph 10 of our letter in which we pointed out that the use of ten sleepers per rail, as proposed for the Baro-Kano line, would impose a highly inconvenient restriction on the working of the pioneer line, and stated that we proposed to assume (in furnishing estimates) that if the lighter permanent-way were adopted it would be laid with eleven sleepers per rail, so as to carry the locomotives in use on the Lagos Railway without restriction of class.

6. Our estimate of £469,365, therefore, covered eleven sleepers per rail, and we noted that a further saving of £9,225 would be effected if ten only were used. It would appear to us that the decision to construct this section as a pioneer line is to be read with our letter of the 19th ultimo as sanctioning eleven sleepers per rail, and we are proceeding on that assumption.

We have, &c.,
BAKER AND SHELFORD.

The Crown Agents for the Colonies,
Whitehall Gardens, S.W.

* Not printed.

No. 36.

CROWN AGENTS to COLONIAL OFFICE.

(Received 31 January, 1908.)

[*Answered by No. 37.*]

Whitehall Gardens, London, S.W., 30 January, 1908.

Lagos Harbour.

(Extract.)

Proposed Increase Wharfage Accommodation.

In our letter of the 27th instant* we stated that we proposed to submit, for the Secretary of State's consideration, some further remarks with regard to the question of wharfage accommodation at Lagos.

I now beg to enclose extracts of recent correspondence which explain the present position of the question, and it will be seen on reference to the plan which accompanied the consulting engineer's letter, enclosed in our letter of the 27th instant,* that no extension of the wharf at Iddo can be expected to provide sufficient accommodation to cope with the traffic of the railway.

It has always appeared to me that a mistake was made on the advice of the then Governor of Lagos in placing the terminus of the railway on Iddo Island, and that the terminus should either have been kept on the mainland or that the line should have been brought into Lagos itself. The half-way course of bringing the railway as far as Iddo Island could only be looked upon as a temporary arrangement, and was practically certain to result in future complications.

When it was settled that Lagos should be made the starting-point of a trunk line of railway the improvement of the harbour so as to make it capable of use by ocean steamers became a necessary consequence, and now that the harbour works have been taken in hand it equally follows that they will have to be carried to their full completion at whatever cost may prove to be necessary.

The ultimate result of such works may, we think, be taken to be sure to be successful, and we think that the harbour improvements and the extension of the railway into Northern Nigeria may be expected to bring to Lagos in the future such an amount of trade and traffic as it is now impossible to estimate. In these circumstances, it appears to us that the time has come when the whole question of terminal facilities at Lagos requires to be fully considered, as the ultimate terminus of the railway must depend upon where the wharfage accommodation is provided.

I beg therefore to suggest that we should be authorised to place the whole question in the hands of Messrs. Coode, Son, & Matthews, as the consulting engineers for the harbour works, with a view to their drawing up a scheme for the wharfage accommodation which should be provided when Lagos becomes an ocean harbour, and the presence in the Colony of Mr. Wilson, the resident engineer for the harbour works, will enable Messrs. Coode, Son, & Matthews to obtain all the information they may require for the purpose.

The reference to Messrs. Coode, Son, & Matthews should, of course, include the question of the best site for the terminus of the railway, and if it should be decided that this must be in Lagos Island then an estimate should be furnished of the cost of the necessary bridge, or for strengthening the existing Carter Road bridge so as to enable it to carry the railway. It appears to us that the possibility of its being found necessary to take the railway into Lagos Island, whatever the cost may be, has to be faced, and that the sooner the question is faced the better it will be in the interests of the Colony.

No. 37.

COLONIAL OFFICE to CROWN AGENTS.

Gentlemen, Downing Street, 24 February, 1908.

I am directed by the Earl of Elgin to acknowledge the receipt of your letter of the 30th of January† relating to wharfage accommodation at Lagos, and to

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* Not printed. † No. 36.

inform you that he approves of your proposal that the whole question should be placed in the hands of Messrs. Coode, Son, and Matthews, as the Consulting Engineers for the Harbour Works, with a view to their drawing up a scheme for the wharfage accommodation which should be provided when Lagos becomes an ocean harbour. His Lordship agrees with you also in thinking that the reference to Messrs. Coode, Son, and Matthews should include the question of the best site for the terminus of the railway, and that, if it should be decided that this must be in Lagos Island, an estimate should be furnished of the cost of the necessary bridge or of strengthening the existing road bridge so as to enable it to carry the railway.

2. In addition to the two possibilities hitherto contemplated (viz., that of carrying the railway across to Lagos Island and that of prolonging it on the mainland from Ebute Metta to a terminus on the shore of the lagoon opposite to Lagos Island north of Apapa Point) it has been suggested to Lord Elgin that a solution of the problem might be found by extending the Iddo Wharf as far as possible along the edge of the deep-water line and then leading it back to the shore of Iddo Island and linking it up with the rails on the island so as to form a complete circuit and thus do away with the difficulties of working the traffic on the wharf which are now experienced and which will grow with the extension of the wharf so long as it remains a *cul de sac*. Messrs. Coode, Son, and Matthews will no doubt consider this suggestion with the other possible courses of action.

3. As Mr. Wilson, the Resident Engineer for the Harbour Works, is now at home on leave, his Lordship trusts that Messrs. Coode, Son, and Matthews may shortly be in a position to furnish at least a preliminary report on the question which will serve to indicate the lines on which enquiry and investigation should proceed locally.

I am, &c.,
R. L. ANTROBUS.

No. 38.

COLONIAL OFFICE to TREASURY.

[*Answered by No.* 40.]

SIR, Downing Street, 26 February, 1908.

I AM directed by the Earl of Elgin to request you to inform the Lords Commissioners of the Treasury that he has had under his consideration your letter of the 12th of September last,* relating to the borrowing by the Government of Southern Nigeria of the funds required for constructing and improving railway and other communication in Southern and Northern Nigeria.

2. In the 3rd paragraph of your letter it is stated that it was agreed in recent discussions that the Government of Southern Nigeria should undertake to spend, out of the total sum of £2,000,000 which their Lordships were empowered to advance by the Public Works Loans Act, 1907, the sum of £1,230,000 on the construction and completion of the Kano line, and that the sums to be devoted to other purposes must accordingly not exceed the balance of £770,000.

I am to explain that the agreement arrived at was not understood precisely in this sense by the representatives of this office at the discussions referred to. It was understood that Southern Nigeria, if she accepted the loan from the Local Loans Fund, would thereby be pledged to carry out the construction and completion of the railway from Baro to Kano (the estimated cost of which, with certain necessary plant for river improvement, was £1,230,000) without any break in the continuity of the work, and without making any further application for assistance from Imperial funds. But it was understood that, subject to the strict fulfilment of this pledge, the Southern Nigeria Government would have discretion in the apportionment of the loan of £2,000,000 among the works contemplated by the Public Works Loans Act, 1907, *e.g.*, that it would be open to them, if they so desired, to spend £1,000,000 on railway extension or road making in Southern Nigeria, subject always to their liability to provide eventually from other sources the necessary funds for completing

* No. 32.

the expenditure on the Baro-Kano line. The capital liabilities to which Southern Nigeria was committed in respect of such works in Southern Nigeria at the time at which the arrangement was made actually equalled, if they did not exceed, the balance of £770,000 mentioned in your letter, so that, under the interpretation placed upon the arrangement by their Lordships, the Colony would have been debarred from carrying out the further extension of the Southern Nigeria Railway, the execution of which the arrangement was intended to facilitate not less than the construction of the Baro-Kano line. It will be seen that there is nothing in the wording of Section 5 of the Public Works Loans Act, 1907, inconsistent with the interpretation placed upon the agreement by the representatives of this office.

3. But, apart from this question, I am to request you to inform their Lordships that since the agreement embodied in Section 5 of the Public Works Loans Act, 1907, was made the trade and revenue of Southern Nigeria have expanded so as to put the Colony into a stronger position for raising by way of loan the funds required. It is estimated that a sum of at least £3,000,000 is required to meet the capital expenditure (including the sum of £1,230,000 for the Baro-Kano Railway), to which the Colony is now committed. If full advantage were taken of the authorised loan from Imperial funds, it would still be necessary for the Colony to borrow not less than £1,000,000 from other sources, and, in view of the fact that the loan from the Local Loans Fund would constitute a prior charge on the revenues and assets of the Colony, this could only be done on onerous terms, and to the serious injury of the Colony's credit. Lord Elgin is, moreover, advised that the state of the money market has improved considerably in the interval, and that Southern Nigeria could now raise a loan on more favourable terms than appeared to be possible in the summer of last year.

4. In these circumstances, his Lordship is disposed to consider that it would be contrary to the interests of Southern Nigeria to take advantage of the opportunity of borrowing from the Local Loans Fund, and that it would be on the whole more advantageous to borrow in the open market the whole of the sum which she requires. The Crown Agents for the Colonies, through whose agency the loans of Crown Colonies are usually raised, consider that, unless some unfavourable change should come over the markets, an issue could be made which would represent a cost to the Colony of something less than 3¾ per cent. as the rate of interest which it would ultimately have to pay for its money, and they explain that it would probably be desirable that the issue should take the shape of short-dated bonds carrying 4 per cent. interest, issued at a price somewhere about par, and convertible into a rather larger amount of 3½ per cent. stock, decreasing in amount each year as the bonds run to maturity.

5. With a view to coming to a definite conclusion as to the comparative advantages of the two methods, Lord Elgin would be glad to be informed what rate of interest the loan from the Local Loans Fund would bear, if application were made for it now, and he would also be glad to be informed whether the Lords Commissioners can suggest any other method of borrowing the sum required in the open market which would be more advantageous than that of borrowing it through the agency of the Crown Agents in the manner suggested by them.

6. If, on the receipt of your reply, Lord Elgin is confirmed in the opinion that, all things considered, it is to the interest of Southern Nigeria to raise a loan in the open market, his Lordship proposes that the Colony should forgo the option of borrowing from the Local Loans Fund conferred by the Act of last session. The obligation of Southern Nigeria to provide funds for carrying the Baro-Kano Railway to completion without break and without delay would, of course, be unimpaired, and similarly the arrangement would still hold good whereby Southern Nigeria is to be relieved, by means of a corresponding remission from her annual contribution to Northern Nigeria, of whatever charge is payable in any particular year in respect of interest on the portion of the loan devoted to the construction of that railway. Lord Elgin recognises, however, that the liability of Imperial funds in this respect should be limited to interest at the rate which the loan would have borne if it had been accepted from the Local Loans Fund.

I am, &c.,
FRANCIS J. S. HOPWOOD.

No. 39.

CROWN AGENTS to COLONIAL OFFICE.

(Received 21 March, 1908.)

Whitehall Gardens, London, S.W., 20 March, 1908.

Lagos Railway Construction—Jebba Ferry.

SIR,

I HAVE the honour to forward a copy of a report, drawn up by Messrs. R. Elliott-Cooper and F. Shelford, setting forth various proposals for carrying the Southern Nigeria Railway across the Niger at Jebba.

2. The final proposal which the Consulting Engineers advocate, *i.e.*, to build the bridge from the north bank to Jebba Island, lay the line across the island, and have a ferry to cross the channel between the Island and the south bank, appears to us, for the reasons given in their report, to be the best solution of the problem.

3. The question of the draft of the ferry-boat might, we think, be left open to be settled in consultation with the Colony, for, if a deeper draft is permissible, both the initial cost and the working expenses of the boat could be reduced, but the draft may depend on whether the boat is afterwards required for work on the Niger or in Lagos Harbour.

4. It will be seen that it is stated that a boat such as is proposed could be sent out at any time of the year, but it would be eminently desirable that she should not be sent in the winter months if it can be avoided.

I have, &c.,
E. E. BLAKE.

Enclosure in No. 39.

(L.O. 1043.)

19 March, 1908.

Southern Nigeria—Lagos Railway Extensions.

Ferry at Jebba.

GENTLEMEN,

WE have to acknowledge the receipt of your letter, E. 366/3, of the 9th instant, stating that you consider it inadvisable to invite tenders for the class of ferry recommended by the Naval Architects at present, and requesting us to consider the whole question of the crossing of the Niger by bridge or ferry *de novo*.

We also have your letter, E. 366/3, of the 11th instant, forwarding copy of a Colonial Office letter raising the question of the desirability of ordering a second ferry-boat and constructing the northern portion of a bridge over the Niger.

We also have your memorandum of the 12th instant forwarding copy of telegraphic correspondence between the Secretary of State and the Governor of Southern Nigeria on the subject of the Jebba Ferry.

2. We have not hitherto felt justified in reporting to you upon the whole question of the crossing of the Niger, as fresh information has been coming forward almost daily, but we now hope to report in a manner that will place all available information before the Secretary of State before deciding upon the course to be adopted.

3. We may briefly recall the history of the Niger crossing.

In November, 1902, Messrs. Shelford and Son reported in favour of the adoption of Jebba as the best place for crossing the Niger. This decision was criticised to some extent, but has since been upheld.

Shelford & Son's Report, November 4th, 1902.

In August, 1906, as the extension of the Lagos Railway towards Jebba seemed likely to be proceeded with, Messrs. Baker and Shelford advised that a careful detailed survey should be undertaken of the site of the bridge. This survey was carried out by Mr. Brounger, Engineer-in-Charge of Surveys during the season 1906-7, and a few additional borings only remain to be done.

Baker & Shelford's L.O. 425, 9th August, 1906.

4. During the progress of this survey Sir Walter Egerton, after conferring with Mr. Brounger at Jebba, proposed that a ferry should be adopted as a temporary expedient, and the survey in progress was accordingly extended to comprise the necessary information as to soundings and currents. After obtaining information by telegram as to the high river velocities observed last September, Messrs. Baker and Shelford were able to report to you on the general question of the installation of a steam-train ferry upon 18th October, 1907.

Colonial Office letter 36289 of 10th October, 1906.

L.O. 810, 18th October, 1907.

5. On the 29th November, 1907, however, the soundings taken over the route proposed for the ferry were received and these rendered it doubtful whether a ferry could work successfully with a draft of 5 feet 6 inches, which had been agreed with your Naval Architects as economical and convenient, without navigating the rocky and dangerous channels wests of Jebba Island.

6. There then ensued a telegraphic correspondence with the Resident Engineer of the northern extension to determine whether a boat of 5 feet 6 inches draft was practicable or what less draft would meet the case. This point was not settled until the receipt of the Resident Engineer's report upon the 28th ultimo, upon receipt of which your Naval Architects were able to recommend a side-paddle steamer. The necessary specifications were received from them on the 11th instant and are now held at your disposal pending the settlement of the general question by the Secretary of State.

7. Having briefly related the past history of this proposal, which is more fully dealt with in our reports, L.O. 810, October, 1907, and L.O. 1027, of the 3rd instant, we now beg to report upon the question generally.

8. *Permanent Solution.*—As regards the permanent solution of the question of the best method of crossing the Niger, we are not yet in a position to give a close estimate of the cost of constructing a bridge from the south bank to the north bank of the Niger, but our information is sufficient to enable us to adopt the approximate figure of £100,000 as the cost of the bridge and the railway across Jebba Island. Taking this approximate figure, the annual charge to the Colony due to the construction of the bridge and railway may be taken at £4,000 per annum in respect of capital charges and £550 per annum for maintenance and working expenses, making £4,550 *per annum in all.*

9. The alternative of a *permanent* steam-train ferry involves the supply of two ferry steamers, as it would not be safe to depend upon a single boat in the case of a permanent ferry; the provision of two inclines and winding engines, and the necessary provision for repairing the boats either *in situ* or at Forcados. The annual cost of the permanent steam-ferry is as follows:—

With one steamer—		
Interest on capital, 4 per cent. on £30,000		£1,200
Working expenses of ferry-steamer and inclines (3 trips or 18 waggons each way per day) including wages, coal, and repairs		3,938
	Per annum	£5,138
With two steamers—		
Interest on capital on a second or reserve boat, 4 per cent. on £16,000	£640	
Upkeep of boat held in reserve, say	500	
		£1,140
	Total per annum	£6,278

The most economical as well as the most convenient permanent solution of the question of the crossing of the Niger is, therefore, the construction of the bridge furnishing a continuous railway from bank to bank.

So far as we are aware no train-ferry has ever been permanently established where a bridge has been practicable at a reasonable cost.

The substitution of bridges for train-ferries across the Forth and Tay Rivers are conspicuous examples of the capitalization of heavy working expenses.

10. According, however, to the expected progress of the Lagos Railway Extension, it will not be possible to begin the construction of the bridge before early in

1909, and allowing 18 months for its actual construction, the completion could not reasonably be expected before the end of 1910. In view, therefore, of the statement contained in the Secretary of State's telegram of the 2nd March to the Governor of Southern Nigeria that "The junction with the Baro-Kano line is indispensable to the future administrative integrity of Nigeria . . . and all reasonable progress of the line is desirable," it is manifest that the decision to construct the bridge, as soon as the railway affords access to the site, would not of itself afford a complete solution of the problem now before the Secretary of State.

Some means of communication across the river will be necessary, not only for the construction of the Jebba-Zungeru line, but to carry the traffic which may be expected from the north side of the river when the northern extension is connected with the Baro-Kano line, or possibly even at an earlier date. This connection should be an accomplished fact some time before the construction of the bridge could be completed.

11. It, therefore, seems to be imperative that some temporary expedient should be adopted pending the completion of the entire bridge, and the following are possible alternatives:—

(A) *The establishment of a bank-to-bank temporary steam-train ferry* carrying six loaded waggons on a 4 feet draft.

As we have already deprecated the establishment of such a ferry as a permanent means of transport across the river, it follows that we are unable to recommend it as a temporary expedient.

(B) *Temporary Bridge.*—As Messrs. Baker and Shelford have already, in their letter, L.O. 867. of the 7th November, 1907, stated that such a temporary structure would approach in cost that of a permanent bridge, this alternative may be set aside.

(C) *The construction of the northern portion of the bridge and the establishment of a temporary ferry over the main channel.*

If a sufficient quantity of materials can be conveyed to Jebba during the ensuing high river to enable the northern portion of the bridge to be proceeded with, this portion of the bridge could be undertaken at once. The construction of the railway over Jebba Island, a distance of only half a mile, could be undertaken at the same time, and this would complete the railway over the river with the exception of the crossing of the main channel. The bridging of the main channel could be deferred until the railway reaches Jebba and enables the materials to be conveyed to the site, and, in the meantime, a temporary ferry could be established over this short distance.

A temporary train-ferry across the main channel of the river would be a very much simpler problem than the crossing of the river from bank to bank, as there is ample water and the steaming distance would be only some 1,200 to 1,500 yards, as against about 3 miles from bank to bank viâ "Jebba Tail," or 1¾ miles from bank to bank when the "Middle Channel" is open.

The advantage of constructing the northern portion of the bridge and the railway over the Island is that the whole of the expenditure, except the cost of the ferry and the temporary inclines upon the south bank of the river and upon Jebba Island, would form part of the cost of the complete bridge, thus reducing to a minimum the expenditure upon temporary expedients.

12. Assuming that the above recommendations are adopted it is necessary to refer briefly to the alternatives which may be considered as a means of crossing the main channel by ferry:—

(A) *A High Level Ferry-boat*, carrying the waggons across the main channel at rail level, *i.e.*, about 16 feet above the water for the greater part of the year. This is practicable and would be the most convenient method of working the traffic, but such a boat, built to convey about 150 tons at so great a height above the water, would be very costly, and, if it should prove necessary to supply two boats, to provide against contingencies, the cost would probably amount to almost, if not quite as much, as the cost of the remaining portion of the bridge itself

The great cost and the impossibility of utilising the boat or boats in

other ways after the bridge is completed renders this alternative out of the question.

(B) *Tug and Waggon-barges.*—This would be a simpler method of dealing with the problem temporarily, but the difficulties of manœuvring the boats at either side and the necessity of providing barges large enough to carry the rolling stock seems to make this alternative exceedingly inconvenient.

(C) *Cranes and small Barges.*—The provision of a jetty at each side of the main channel and the necessary number of barges would enable cargo to be discharged at each side and loaded into barges, to be towed or paddled across the water.

This alternative, however, would not provide for the conveyance of the rolling stock across the river, upon which Sir Walter Egerton has laid considerable stress, and would, therefore, probably not meet with the approval of the Colonial Government.

(D) *A temporary Train-ferry Steamer of reduced capacity.*—We consider that this proposal as a temporary expedient best meets the case. Owing to the greatly reduced steaming distance of such a boat, we are of opinion that a vessel carrying three 24-ton waggons on a single line of rails will be sufficient. Such a boat would carry a locomotive when required, and as the adoption of this alternative would be obviously a temporary measure only, we consider that the Government might accept the risk of building one such boat only. If a second boat should prove necessary it could be added later. Although the water over the main channel is ample, we would recommend that the boat or boats should be built with a loaded draft of 4 feet, as they would then be available for ordinary service on the Niger, when no longer required for the ferry.

In view of the recommendation of the Naval Architects we recommend the side-paddle type of steamer, as overcoming the difficulties experienced with screw boats on the Niger, while avoiding the geared stern-wheel type, which we understand to be practically in an experimental stage and has not proved satisfactory elsewhere. The side-paddle steamer will also have greater facility in manœuvring alongside the jetties, and we understand from the Naval Architects that she could make the voyage to the Colony under her own steam at any time of the year. Such a boat would have the advantage that she would be useful for conveying construction material across the river, and would later be available for carrying the traffic offered. During the erection of the bridge the vessel would be of use for carrying the girders out to their positions for erection, and, upon the completion of the bridge, the vessel or vessels would be useful upon the ordinary Niger service.

13. We, therefore, recommend, for the consideration of the Secretary of State, that the construction of the northern portion of the Niger Bridge as forming a part of the permanent bridge should be proceeded with as well as the construction of the railway over Jebba Island as forming part of the main line; the provision of temporary inclines on the south bank of the river and on Jebba Island; and the building of a self-propelling side-paddle steam-train ferry to carry three loaded waggons on a single line of rails with a draft of 4 feet, to be afterwards used on the ordinary Niger service.

14. The cost of this proposal may be estimated as follows:—

Northern portion of the bridge and the railway across Jebba Island	£33,000
One ferry-steamer	9,500
Sidings and inclines on the south bank and on Jebba Island ...	13,500
	£56,000

The greater part of this expenditure would be part of the cost of building the permanent bridge, and as the steamer could be used for future traffic purposes the expenditure on temporary expedients for the crossing of the river is reduced to a minimum.

15. The early authorization of our proposal will obviate the necessity for an expenditure, possibly considerable, upon temporary works for conveying construction material across the river.

We have, &c.,
R. ELLIOTT-COOPER,
F. SHELFORD,
Joint Consulting Engineers.

To the Crown Agents for the Colonies,
Whitehall Gardens, S.W.

No. 40.

TREASURY to COLONIAL OFFICE.

(Received March 24, 1908.)

[*Answered by No.* 41.]

SIR, Treasury Chambers, 23 March, 1908.

THE Lords Commissioners of His Majesty's Treasury have had before them your letter of the 26th ultimo,* relative to the borrowing by the Government of Southern Nigeria of the fund required for constructing and improving railway and other communication in Southern and Northern Nigeria.

2. With regard to the terms of the arrangements under which the assent of this Board was given to the application of the Local Loans Fund for the purpose in question, I am to state that my Lords are unable to agree that the terms of paragraph 3 of the Treasury letter of 12th September last† to which you refer do not correctly represent the arrangement which was arrived at in the discussions which took place on the subject. My Lords would remind the Secretary of State for the Colonies that the first proposal, as the official records clearly show, was to lend £1,230,000 to Southern Nigeria solely for the purpose of constructing and completing the line from Baro to Kano, and the amount of the loan was increased at the last moment before the introduction of the Public Works Loans Bill from £1,230,000 to £2,000,000 merely because it was pointed out that the conditions of a loan from the Local Loans Fund would prevent Southern Nigeria from borrowing elsewhere for other purposes. My Lords would not have contemplated making a loan for those other purposes except as the inevitable complement of the Colony taking up the loan for the Baro-Kano line.

3. In reply to the enquiry in paragraph 5 of your letter, I am to state that the present rates of interest for loans from the Local Loans Fund are:—

For periods not exceeding	30	years	... ...	3½ per cent.
,, ,,	50	,,	... ...	3¾ ,,

I am also to state that if it is desired to borrow in the open market my Lords cannot suggest any better method of raising the loan than that suggested by the Crown Agents.

4. With reference to the observations contained in paragraph 3 of your letter, I am to draw attention to the effect of Sub-section 3 of Section 5 of the Public Works Loans Act, 1907, which gives to the Local Loans Fund loan, whenever borrowed, priority over any charges not existing at the date of the passing of the Act. If, therefore, Southern Nigeria were now to go into the open market for a loan, the priority of any loan hereafter raised out of the Local Loans Fund would probably affect the terms on which she could borrow unless the prospectus definitely pledged the Colony never to take up a loan from the Local Loans Fund under the conditions of the Act.

5. My Lords take note of the observations of the Earl of Elgin conveyed in paragraph 6 of your letter, with which they concur.

I am, &c.,
G. H. MURRAY.

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* No. 38. † No. 32

No. 41.

COLONIAL OFFICE to TREASURY.

SIR, Downing Street, 10 April, 1908.

I AM directed by the Earl of Elgin to acknowledge the receipt of your letter of the 23rd of March,* relating to the borrowing by the Government of Southern Nigeria of the funds required for constructing and improving railway and other communication in Southern and Northern Nigeria.

2. I am to request you to inform the Lords Commissioners of the Treasury that Lord Elgin has now decided that Southern Nigeria shall forgo the option of borrowing from the Local Loans Fund conferred by the Public Works Loans Act. 1907, and that the Crown Agents for the Colonies have been authorised to raise a loan of £3,000,000 on behalf of the Colony in the open market, at such time and on such terms as may appear to them most favourable.

I have, &c.,
R. L. ANTROBUS.

No. 42.

COLONIAL OFFICE to CROWN AGENTS.

GENTLEMEN, Downing Street, 10 April, 1908.

I AM directed by the Earl of Elgin to transmit to you, with reference to the letter from this Office of the 13th of March,† copies of the Southern Nigeria General Loan and Inscribed Stock Ordinance, 1908 (No. VI. of 1908),† and the Loan Ordinance, 1908 (No. VII. of 1908). The Governor of the Colony has been informed that His Majesty will not be advised to exercise his power of disallowance in respect of these Ordinances.

2. As the result of correspondence‡ with the Treasury, a copy of which is enclosed for your information, Lord Elgin has now decided that Southern Nigeria shall forgo the option of borrowing from the Local Loans Fund conferred by the Public Works Loans Act, 1907. His Lordship accordingly approves of your raising on behalf of the Colony in the open market, at such time and on such terms as may appear to you most favourable, a loan of £3,000,000 for the purposes specified in the schedule to Ordinance No. VII. of 1908.

I am, &c.,
R. L. ANTROBUS.

Enclosure in No. 42.

(L.S.)
W. EGERTON.

No. VII. 1908.

Title. AN ORDINANCE FOR RAISING THE SUM OF £3,000,000.

Date. [5th March, 1908.]

Whereas it is expedient to raise by loan a sum not exceeding £3,000,000 for the purpose of defraying the cost of certain public works and undertakings;

Enactment. Be it therefore enacted by the Governor of the Colony of Southern Nigeria with the advice and consent of the Legislative Council thereof as follows:—

Short title. 1. This Ordinance may be cited as the Loan Ordinance, 1908.

Authority to issue stock or debentures to amount of £3,000,000, and cost of issue. 2. The Governor is hereby authorized to issue stock or debentures or both under the provisions of the General Loan and Inscribed Stock Ordinance, to an amount sufficient to produce as nearly as may be the sum of £3,000,000 sterling and such further sum as may be necessary to defray the expenses of issue, the said sum of £3,000,000 to be appropriated and applied to the purposes specified in the schedule hereto.

Contribution Sinking Fund. 3. Contribution to sinking fund as contemplated by the provisions of Sections 11 and 24 of the Ordinance above referred to shall commence three years from the date of the first issue of debentures or stock under this Ordinance.

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* No. 40. † Not printed. ‡ Nos. 38, 40 and 41.

THE SCHEDULE.

Mileage.	Works.	Amount.
		£
62¼	Railway, Oshogbo to Ilorin (Completion)	173,426
56	Railway, Ilorin to Jebba	402,053
	Railway Ferry at Jebba	30,000
153	Jebba to junction with Baro-Kano line about 30 miles beyond Zungeru (pioneer type)	586,845
	Rolling stock for Jebba-Zungeru section	50,000
	Extension of Railway Wharf at Iddo	23,000
	Open Line { Additional Rolling Stock	90,000
	Open Line { Additional Workshops, Sheds, &c., at Ebute Metta	40,000
	Improvement of Ibadan-Iddo section and other Railway Extensions	174,676
400	Railway from Baro to Kano (pioneer type) (*a*)	1,200,000
	Dredgers and Barges, &c., for improving Niger Navigation (*a*) ...	30,000
671¼	Lagos Harbour Works	200,000
	Total	3,000,000

(*a*) These two items are being carried out by the Northern Nigeria Government.

Passed in the Legislative Council this 5th day of March, in the year of our Lord, one thousand nine hundred and eight.

This printed impression has been carefully compared by me with the Bill which has passed the Legislative Council, and found by me to be a true and correct printed copy of the said Bill.

SIMON I. de SOUZA,
Clerk of the Legislative Council.

Presented for authentication and assent as a correctly and faithfully printed copy of the Bill as passed by the Legislative Council.

C. E. DALE,
Acting Colonial Secretary.

E. A. SPEED,
Attorney-General.

Assented to in His Majesty's name this 5th day of March, 1908.

W. EGERTON,
Governor.

No. 43.

SIR E. P. C. GIROUARD to COLONIAL OFFICE.

(Received 13 April, 1908.)

MY LORD, Colonial Office, 13 April, 1908.

I HAVE the honour to submit, for your consideration, the accompanying correspondence which has taken place between Mr. A. W. Robinson, M.I.C.E., and myself on the subject of the improvement of the navigation of the Niger River.

You will observe that Mr. Robinson is satisfied that the system of improvement suggested by me in my report of the 30th May, 1907,* is, in his opinion, eminently suited to the conditions obtaining on the River Niger. Though Mr. Robinson has not had an opportunity of visiting West Africa, he has gone most carefully through all the data collected by the Government of the Protectorate and had several lengthy conferences with the Marine Superintendent of the Protectorate.

He is not of opinion that any highly useful purpose would be served by a visit to the river, and in view of the fact that other eminent consulting engineers have found it possible to advise on dredging matters in West Africa without personal visits to the coast, I am not prepared to recommend that any further expenditure should be entailed in surveys of the hydrographic or other conditions of the river.

* No. 16.

Mr. Robinson's long experience of the Mississippi and other American rivers and his subsequent connection with the Nile entitles me to consider his advice as the best obtainable.

On this advice I beg to recommend that his services be secured in designing a dredger, and that he be placed in communication with the Crown Agents for the Colonies in the placing of an order for one such machine. A sum of £30,000 having been included in the estimates of the Baro-Kano Railway for the purpose of improving the Niger navigation. Mr. Robinson, it will be noted, estimates the outlay at about £24,000, though it is hoped that £23,000 may suffice for actual construction.

I would recommend that his suggestion as to the two firms to be asked for tenders and for inspection should be adopted.

The dredger in question would be for delivery about June, 1909, and could begin operations in the low-water season beginning January, 1910.

The operation of the dredger will entail an annual charge of some three thousand pounds on the funds of the Protectorate for 1910-11, a sum which I have every confidence can be readily furnished from the revenues of the Protectorate without institution of navigation dues.

I have, &c.,
E. P. C. GIROUARD.

Enclosure 1 in No. 43.

SIR, London, 8 April, 1908.

WITH regard to the problem of dredging the Niger, I beg to say that I have studied all the data laid before me with a view to reaching a conclusion as to whether a suitable dredger of moderate cost could be built that would accomplish the object you have in view. I have also prepared a list of questions of additional data desired, to all of which I have received full and satisfactory replies.

From this information I conclude that a first dredge could be built at a cost of about £25,000, delivered on the river ready for work, that would have sufficient capacity not only to demonstrate the feasibility of the scheme, but which would undoubtedly effect a measurable improvement in the low-water navigation, especially in the upper river from Lokoja to Baro, where it is primarily needed.

I regard the physical conditions of the river as distinctly favourable to this system of dredging, more so in several respects than in the Mississippi, where, as you know, this system of annual reduction of the bars is in successful operation, and with which I am completely familiar.

The capacity of these dredges is such that they can reduce an ordinary bar or "crossing" to navigable condition in from two to three days. Being self-propelling the dredge can therefore patrol the river and cover a number of such bars within a reasonable time.

It would appear from a study of the information laid before me, that two, or at most three, such dredges would suffice for the maintenance of low-water navigation on the Niger to a commercial depth, at an annual charge equal to the cost of their operation and maintenance.

I am, &c.,
A. W. ROBINSON.

To Sir Percy Girouard, K.C.M.G.,
High Commissioner, &c.,
Colonial Office.

Enclosure 2 in No. 43.

SIR, Colonial Office, 9 April, 1908.

I HAVE to thank you for your letter of the 8th instant with reference to proposed dredging operations to increase the efficiency of the navigation of the Niger River. In view of your recommendations, and after the long conferences held with you and Mr. Elliott, our Marine Superintendent, I should be glad if you could furnish me with a preliminary sketch of the proposed type dredger.

In your preliminary report it would be desirable to secure an expression of opinion from leading dredge builders as to the class of motive power to be adopted for propelling the vessel, *i.e.*, screw or stern-wheel, and to state whether the sum

probably available, namely, £25,000, would cover the cost of the dredger delivered in Northern Nigeria. I am, of course, made fully aware that the system of dredging proposed would involve an annual charge on the Protectorate funds equal to the cost of maintenance and depreciation of the vessels proposed.

I have, &c.,
E. P. C. GIROUARD.

A. W. Robinson, Esq., M.I.C.E.

Enclosure 3 in No. 43.

SIR, London, 11 April, 1908.

WITH reference to your letter of 9th April, I have the honour to enclose herewith a preliminary drawing, dated April 10th, 1908, of the hydraulic dredge that I would propose for the River Niger.

In this design I have conformed to the requirements laid down in the memorandum dated April, 1908, by Mr. Elliot, replying to my questions.

You will see that the design is that of a light-draft river steamer fitted in front with dredging apparatus of the Mississippi type. It will have a floating discharge-pipe 800 feet long of the deflecting type. This dredge can set its own anchorages and make a cut of 18 feet wide by 3 feet deep at a rate of advance of 350 lineal feet per hour in ordinary sand. This is equal to a capacity of 700 cubic yards per hour.

I beg to state, for your information, that a vessel about the size shown on drawing can be built and delivered on the Clyde for the approximate sum of £24,000.

I propose to propel the vessel by stern paddle-wheel with independent engines in preference to tunnel-screw for the following reasons:—

(1) It is more accessible and more easily repaired.
(2) It is slower speed and hence less subject to wear and tear.
(3) It is more effective when backing and manœuvring.
(4) Being independent, a break-down of the main engines would not incapacitate the propelling power, and she could go to port for repairs.
(5) It is less liable to breakage in shallow water or clogging with a snag, &c.
(6) The adoption of the tunnel-screw would require twin-screws, which, if driven from the main engines would require twin reversing engines and twin pumps. These are objectionable from a dredging point of view.

The most that can be said for the tunnel-screw is that it is a little lighter, and, therefore, cheaper, but I regard the foregoing advantages as much more than worth the difference, and, furthermore, the stern-wheel can be built within the limit of cost and draft of water.

The type of main engine to drive the pump will be of the high-speed enclosed type with forced lubrication, for the following reasons:—

(1) It has fewer parts than a marine type.
(2) The high speed permits the use of a small diameter, light, and efficient pump.
(3) This engine will run for long periods with practically no wear and no skilled attention, and hence is specially suited to your climate and class of labour.

I may say that this type of engine has been adopted for dredges on the Nile and has the approval of the Clyde builders.

The type of boilers will be "locomotive marine." I recommend this type for the following reasons:—

(1) It is a known and successfully-tried type on the River Niger.
(2) It is lighter and less costly than other types.
(3) It is well adapted for burning wood as coal, having a capacious firebox with specially designed doors, whereas a marine boiler with round furnaces will not burn wood satisfactorily at the high power we require.

The dredging apparatus and the general arrangement of the boat will be in full accord with the local conditions on the Niger.

It is proposed to specify that the dredge shall be built complete and tested under steam for a specified duty both as to dredging and speed, before leaving her builders' hands. Upon the satisfactory completion of trials, the builders will dismantle the dredge and make ready for towing to destination—the towing to be at the expense of the Government.

I may say that I have conferred on the 10th instant with Messrs. Lobnitz and Company and Messrs. Simons and Company, at Renfrew, Scotland, as to the general features of this design, and that they have both independently expressed themselves to me to the effect that—

(1) A serviceable and successful vessel can be built on the lines laid down and at approximately the limit of cost named.
(2) They are both unequivocally in favour of the stern-wheel and opposed to the tunnel-screw for practical reasons.
(3) The type of main engine and boilers proposed by me also meets with their approval.

The two companies named are both well equipped to build successfully a vessel of this type, and their work has been under my observation for a number of years with satisfactory results, so that you would be safe in the hands of either company. I would not be in favour of placing an important order of this kind with any other less experienced firm or even with others at a lower competitive figure, which would only result in poorer value being given.

For inspection of the work while under construction I recommend that a practical dredge inspector on the Clyde be employed. Such a man is Mr. Robert Anderson, Clyde Road, Renfrew. He has inspected for various Governments, for Coode, Son, & Matthews, and is inspecting the Nile dredgers. He is also well-up in light-draft river steamers, and his charge is a nominal sum per month, for visiting the works every day. The steel material is certified by Lloyds' surveyor at the mill without extra charge. In this way you will get the best practical service and at the least cost.

I feel satisfied that a dredge built along the foregoing lines could not fail to do good work, and serve to demonstrate in a practical way that the navigable condition of the Niger can be materially improved at a moderate annual outlay.

Respectfully submitted.

A. W. ROBINSON.

To Sir Percy Girouard, K.C.M.G., D.S.O., R.E.,
High Commissioner of Northern Nigeria,
Colonial Office.

No. 44.

COLONIAL OFFICE to CROWN AGENTS.

GENTLEMEN, Downing Street, 20 April, 1908.

WITH reference to the semi-official communications which have been made to you from this Department on the subject of the proposed purchase of a dredger for the improvement of navigation on the Niger, I am directed by the Earl of Crewe to enclose, for your information, a copy of a letter* from Sir Percy Girouard enclosing correspondence between himself and Mr. A. W. Robinson, A.M.I.C.E., on the subject. Mr. Robinson was consulted in the matter on account of his large experience of dredging operations on the Mississippi, the Nile, and other rivers, where dredgers designed by him are now in successful operation.

2. The proposals contained in Sir P. Girouard's letter have been sanctioned, and I am to authorize you to enter into official communication with Mr. Robinson, whose address is 14, Phillips Square, Montreal, Canada, with a view to the submission at an early date of the detailed drawings and specifications. It is of the

* No. 43.

greatest importance that the dredger should be delivered in time to begin operations in January, 1910.

3. A copy of the "preliminary drawing," referred to in Mr. Robinson's letter of the 11th of April,* has been handed to you privately.

I am, &c.,
C. P. LUCAS.

No. 45.

THE SECRETARY OF STATE to THE ACTING GOVERNOR OF NORTHERN NIGERIA.

SIR, Downing Street, 24 April, 1908.

WITH reference to Sir P. Girouard's despatch of the 19th of December last,† I have the honour to enclose, for your information, a copy of a letter‡ from him, enclosing copies of correspondence with Mr. A. W. Robinson on the subject of the proposal to employ a dredger on the Niger for the purpose of improving the navigation of that river.

2. The proposals contained in Sir P. Girouard's letter have been approved, and the Crown Agents have been authorised to enter into communication with Mr. Robinson with a view to the preparation, at an early date, of the necessary drawings and specifications.

I have, &c.,
CREWE.

No. 46.

THE GOVERNOR OF SOUTHERN NIGERIA to THE SECRETARY OF STATE.

(Received 15 May, 1908.)

MY LORD, S.Y. "Ivy," Forcados River, 27 April, 1908.

WITH reference to the correspondence§ in which it has been decided to build a railway bridge from the northern bank of the Niger River to Jebba Island and to construct a railway line across that island to its southern bank at a cost of £33,000, I have the honour to request that I may be informed the estimated cost of completing bridge communication to the south bank of the river at Jebba, as worked out on a complete detailed design for that structure.

2. From the previous correspondence on the subject I gather that the recent surveys carried out in 1907 by Messrs. Brounger and Fleming have resulted in the confirmation of the original rough estimate of Messrs. Baker and Shelford of the cost of £87,000 of bridge communication over the Niger at Jebba. It appears therefore, that deducting the £33,000 now being expended from the total amount, communication by bridge over the Niger can be established by the expenditure of a further sum of, say, £60,000. If this is so, and even if it should amount to rather more than this sum, I would recommend that the construction of the missing link be authorised.

3. I understand that the bridge could not be completed in less than three years from the date of sanction being given. The ferry, therefore, is indispensable, but the bridge should be built and the ferry transferred to Lagos as soon as the bridge is completed.

I have, &c.,
W. EGERTON,
Governor.

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* Enclosure 3 in No. 43. † Not printed. ‡ No. 43. § Not printed.

No. 47.

CROWN AGENTS to COLONIAL OFFICE.

(Received 16 June, 1908.)

(Extract.)

Whitehall Gardens, London, S.W., 15 June, 1908.

Lagos Railway Construction—Jebba Ferry and Bridge.

I HAVE the honour to acknowledge the receipt of your letter of the 29th of May,* transmitting to us a copy of a despatch from the Governor of Southern Nigeria on the subject of the Niger crossing at Jebba.

2. We communicated the despatch to the Consulting Engineers, and I transmit, for the information of the Secretary of State, a copy of their reply, from which it will be seen that the Governor's conclusion that the Niger Bridge can be completed by the expenditure of a further sum of about £60,000 is approximately correct.

Enclosure in No. 47.

CONSULTING ENGINEERS to CROWN AGENTS.

(L.O. 1133.)

35a, Great George Street, Westminster, S.W., 5 June, 1908.

Southern Nigeria.

Lagos Railway Construction—Jebba Ferry and Bridge.

GENTLEMEN,

WE have the honour to acknowledge the receipt of your letter, E. 366/3, of the 3rd instant, forwarding a copy of a despatch from the Governor of Southern Nigeria on the subject of the Niger crossing at Jebba.

2. His Excellency's conclusions as to the cost of completing the Niger Bridge are approximately correct, and we are only awaiting the result of further observations and borings by the Resident Engineer, as to which instructions have been given to him, to enable us to complete the detailed designs to which His Excellency refers.

3. As in accordance with the Governor's despatch the question of completing the construction of the whole bridge seems likely to become imminent, we beg to be informed whether the Government of Southern Nigeria desire an opening span in the bridge over the Southern Channel to facilitate the navigation of the river above Port Ilorin. If the opening is desired, we should be informed of the width of clear opening required to allow of the passage of the largest steamers likely to navigate the river for many years to come. Such a span could best be arranged in the comparatively deep water near the Ilorin shore.

4. As this question affects the general lay of the bridge as well as its cost, it is desirable that the views of the Government should be obtained upon it as soon as possible.

We have, &c.,

F. SHELFORD,

for Consulting Engineers.

No. 48.

THE GOVERNOR OF SOUTHERN NIGERIA to THE SECRETARY OF STATE.

(Received July 10, 1908.)

[*Answered by No.* 49.]

MY LORD, Government House, Lagos, Southern Nigeria, 23 June, 1908.

I HAVE the honour to ask for your Lordship's formal sanction to the expenditure of £200,000 on the Lagos Harbour Works, being the amount provided in Ordinance No. 7 of 1908 for that purpose.

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* Formal letter transmitting copy of No. 46.

2. Your Lordship's despatch of 10th April* informed me that His Majesty will not be advised to disallow this Ordinance, but stated that specific approval of each work being undertaken, in the cases in which such approval has not been already given, must be obtained before expenditure is incurred.

3. It may be convenient for me now to give a brief retrospect of the progress of these works.

Messrs. Coode, Son, & Matthews in 1898 drew up a scheme for effecting a deep channel into Lagos Harbour; the works contemplated were:—

An eastern training bank 3,000 feet long;
An eastern mole 7,000 feet long;
A western mole 7,000 feet long;
A western training "bank" or mole 4,800 feet long;

and estimated the cost at £797,000.

No dredging was contemplated or considered necessary if this scheme was carried out in its entirety.

In 1906 Messrs. Coode, Son, & Matthews reconsidered their estimate of the cost, under present conditions, and reported that the complete scheme would cost £897,000, the increase being due to higher rate to be paid to railway for conveyance of the stone.

In 1904 consideration of the work was taken up anew, and in 1905-6 it was decided to dredge and also to construct a portion of the eastern mole, 3,800 feet in length, as supplementary to dredging. Lord Elgin's sanction to this work was conveyed to me in his despatch of 15th September, 1906,† authorising the expenditure of £150,000.

The President Engineer appointed to carry out the construction of the mole arrived in the Colony on the 28th April, 1907.

The preliminary works comprised:—

(*a*) The erection of an iron pier at the Signal Station near the mouth of the lagoon;
(*b*) The building of three barges and the purchase of a steam-tug boat;
(*c*) The erection of powerful cranes on the pier near the Signal Station at mouth of lagoon and on the Iddo Railway pier;
(*d*) The purchase of rolling-stock to convey the stone the 62 miles from Abeokuta to Iddo, it being then transferred to barges, taken to the Signal Station wharf, lifted by the crane there, and conveyed in trucks to the tipping point;
(*e*) The purchase of additional engines for the railway to deal with the stone traffic;
(*f*) The opening up of a large stone quarry at Abeokuta;
(*g*) The erection of buildings both at Abeokuta and at the Signal Station for the European staff

4. The present position is as follows:—

£83,000 has been spent on the plant, exclusive of the additional engines required by the railway for dealing with the stone traffic, but inclusive of additional plant ordered in February last, Lord Elgin then approving of purchase of additional rolling-stock and three more barges at a cost of £21,000, so that four trains of stone a day may be brought down.

The purchase of further engines for the railway to deal with this greater traffic has also been approved.

The steam-tug sailed from England on the 6th of the present month.

One barge has been launched, one is half built, and the building of the third has just been commenced; these barges are being built locally.

5. The tipping of the first stones for the mole took place on Monday, the 8th instant; the members of the Legislative and Executive Councils, of the local Bar, the Chamber of Commerce, the White-cap Chiefs, and all Heads of Departments being specially invited to attend.

6. At present one train of stone (about 128 tons) a day is being brought down;

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* Not printed. † No. 6.

more cannot yet be dealt with, as the whole of the rolling-stock originally ordered has not yet been received, and also because two trains a day cannot be dealt with until the second barge is ready for use.

7. The original sanction to the expenditure of £150,000 was for a mole 3,800 feet long. The mole commences near the Signal Station, and does not reach the sea until 2,400 feet has been constructed. Until this point is passed its effect on the entrance to the harbour will be nil. The effective portion of the mole now authorized, therefore, is only 1,400 feet. It is estimated by Mr. Wilson that the expenditure of the additional £50,000 should add another 1,300 feet, or 2,700 feet in all beyond the present sea-front.

8. It is hoped that the additional rolling-stock and barges ordered in February last will be available for use by the end of the present year. If this occurs the rate of progress should be as follows:—

For the next two months one train a day.
From August to December two trains a day.
In 1909 four trains a day.

If this programme is carried out, an eastern mole 5,100 feet long should be completed in rather less than two years from the present time at a cost of £200,000.

9. The Resident Engineer considers that it is certain that some portion of the western mole must also be constructed. The necessity for this should now be considered, as a wharf on the western side of the entrance will have to be erected *before that mole can be commenced*, and it may be assumed that that wharf will not be ready for use within less than one year from the time sanction is given to its erection.

10. The cost of the existing eastern wharf was £8,000, and in addition a locomotive, costing £1,040, and two cranes, costing £1,500 each will be required.

11. I have the honour, therefore, to ask for your Lordship's approval of the expenditure of £200,000 on the eastern mole, and that the question of the necessity for the erection of some portion of the western mole should be at once considered, and, if the Consulting Engineers report that this is essential, that immediate sanction should be given to the necessary expenditure on the western wharf and of the purchase of the locomotive and cranes required for that portion of the works. This expenditure may be taken at probably not more than £13,000, as no more rolling-stock will be required for the railway nor any addition to the floating plant.

Further sanction will be required later for the expenditure of such additional sum as may be necessary to construct the portion of the western mole that the Consulting Engineers may advise should be undertaken.

12. It may be advisable for me to point out that this Government is practically committed to the carrying out of such portions of Messrs. Coode, Son, & Matthews's complete scheme as may be necessary to enable the creation and maintenance by dredging of a deep channel safe for the largest steamers employed in the West African trade, and that, if this result cannot be otherwise obtained, the complete scheme estimated to cost £897,000 must then be executed.

13. The trade of Lagos in 1907 amounted to £2,926,764. The tonnage of cargo taken across the bar in small branch steamers amounted approximately to 249,000 tons. The cost per ton involved by the transhipment into ocean steamers at Forcados has been variously estimated, but has recently been placed at 12s. 6d. If this figure is correct the annual saving in freight by the removal of the bar would be, on last year's trade, no less than £155,625—equal to the interest at 4 per cent. on a capital sum of £3,890,625. There is, therefore, no doubt that the expenditure of much larger sums than the estimated cost of the complete scheme would be justifiable to ensure a deep and permanent entrance into Lagos Harbour without considering the possibilities of increased trade from its connection with the centre of the African continent by the Kano extension of the railway.

I have, &c.,
WALTER EGERTON,
Governor.

No. 49.

THE SECRETARY OF STATE to THE GOVERNOR OF SOUTHERN NIGERIA.

[*Answered by No.* 51.]

SIR, Downing Street, 31 July, 1908.

I HAVE the honour to acknowledge the receipt of your despatch of the 23rd of June* describing the present position of the various works in progress in connection with the improvement of Lagos harbour.

2. In your despatch of the 29th of February last† (in the series dealing with the loan legislation), you explained that the £50,000 for the enlargement of the Customs Wharf, originally included among the loan works, was being defrayed from revenue; and that the £150,000, originally sanctioned and included among loan works for an eastern mole, 3,800 feet long, was being increased to £200,000. In the despatch under reply, you ask for authority to incur this additional £50,000 on the eastern mole.

3. You also request, in the eleventh paragraph, that the question of the necessity for the erection of some portion of the western mole should be at once considered and, if the Consulting Engineers report that this is essential, that immediate sanction should be given to the necessary expenditure on the western wharf, and for the purchase of the locomotive and cranes required for that portion of the works. The wharf would apparently cost £8,000; the two cranes £1,500 each; and the locomotive £1,040. You put the round figure total at £13,000.

4. It is true that the eastern mole of 3,800 feet already sanctioned (at an estimated cost of £150,000) has been commonly treated and spoken of as a first instalment of the Consulting Engineers' complete scheme, which is now estimated to cost £897,000. The mole is so spoken of in the nineteenth paragraph of the minutes of the Conference held at the Colonial Office on the 9th of May, 1905, a copy of which was sent to you in Mr. Lyttelton's Lagos despatch of the 9th of June, 1905;† and again in the Consulting Engineers' report of the 17th of July, 1906, a copy of which was sent to you in Lord Elgin's despatch of the 15th of September, 1906.‡ On the other hand, you will recollect that the Consulting Engineers stated, in their report of the 17th of July, 1906, already referred to, that they had no doubt as to the satisfactory results which would follow the construction of the eastern mole of 3,800 feet by itself. Moreover, the purchase of a second dredger has been sanctioned this year which is to cost £76,000 at least, *i.e.*, £26,000 more than the "Egerton." I will not raise any objection to the expenditure of the additional £50,000 already provided for in the Loan Ordinance on the eastern mole, if it is considered necessary. But it seems to me that, with this expenditure, a point will have been reached at which it will be convenient to stop, at any rate for the time being, until it has been possible to determine clearly what results have been obtained by the expenditure of £200,000 on the eastern mole and the expenditure on the two dredgers. I fully realize that the main and ultimate object in view in all these harbour improvements is the possibility of bringing in the ocean steamers themselves over the bar, and thereby doing away with the necessity of the branch boats and the cost of transhipment at Forcados. At the same time I consider that this harbour expenditure, which is largely experimental, should be incurred cautiously and by a well-marked series of steps, accompanied by a careful review of the results achieved by one step before proceeding to the next.

5. As Messrs. Wilson and Coode, of the firm of Coode, Son, & Matthews, are proceeding to Lagos on the 15th of August, you will have the advantage of being able to discuss these questions with them in person. But I have thought it well to inform you in the meantime of the attitude to which I am inclined in the matter, and a copy of your despatch and of this reply has been sent to the Crown Agents to be communicated to Messrs. Wilson and Coode before they sail.

I have, &c.,
CREWE.

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* No. 48. † Not printed. ‡ No. 6.

No. 50.

THE GOVERNOR OF SOUTHERN NIGERIA to THE SECRETARY OF STATE.

(Received 15 August, 1908.)

(Extract.)

Government House, Lagos, Southern Nigeria, 27 July, 1908.

* * * * * * * * *

Sir Percy Girouard when in Lagos showed me a report by Mr. Robinson, M.I.C.E., who was the river-dredging expert selected to visit the Niger and report on the scheme proposed by him for deepening that river. From Mr. Robinson's memorandum on the dredging of the Mississippi I have made the following extracts :—

"29. The adoption of dredging as a quick and comparatively cheap expedient for relief of low-water navigation has been fully justified by the results, from an engineering if not from a commercial point of view, in that a navigable channel of the required depth and width has been maintained through a series of years. * * * The failure of commerce to respond to the improved conditions of the channel which has been maintained for a number of years past is disappointing. It can be accounted for only on the theory that confidence in the permanence of the improvement still hesitates.

"30. Commercial statistics—

* * * * * * * * *

"TABLE 5.

"SHOWING ANNUAL TRAFFIC IN TONS ON MISSISSIPPI RIVER BETWEEN CAIRO AND MEMPHIS,

—	1901.	1902.	1903.	1904.	1905.	1906.
Coal	1,359,462	1,289,830	1,266,378	1,250,467	1,328,930	1,030,000
Other products ...	946,840	1,258,501	984,082	902,787	909,433	689,893
Total ...	2,306,302	2,548,331	2,250,260	2,153,254	2,238,363	1,719,893

"31. From this table it appears that coal is the principle item of traffic; large numbers of coal barges rafted together are floated down from the Ohio coalfields to the lower river port. *The remainder of the traffic is not commensurate with the facilities afforded, and, what is more discouraging, is decreasing in volume.* Roughly speaking there is a traffic of about two million tons annually on the dredged portion of the river, and the dredging expenditure is about $300,000 per annum, or 15 cents per ton on the traffic. It thus appears that the expense of the dredging is excessive when the volume of commerce benefited is considered, and that *it would not be justified from purely commercial considerations alone.* It is the policy of the Government to develop the internal waterways as national highways, and it is hoped that as the permanence of the work is established and the channel improved on a larger scale that commerce will respond to the opportunity presented to it. *The coal traffic referred to benefits but little from the dredging* between Cairo and Memphis, for the reason that it originates on the Ohio River, where the available low-water draft of water is less, and hence could pass down on a less depth than is maintained in the dredged channel.

"32. The multiplication of railways has for many years had the evident effect of taking the traffic away from the river for all except the coal trade from the upper to the lower river, and the small local trade between river points. *The railway possesses the advantage of providing a daily service to and from all interior points,* and at low rates for long distances. The water-borne traffic is certainly cheaper per ton than the railway, but the former *is limited to goods that can be handled on the banks of an alluvial river whose water-level varies* 40 *feet,* while the railway furnishes transport direct from the factory of the producer to the door of the consumer."

It will be observed that although the dredging work on the Mississippi has been effected as easily as was estimated, yet, even with the immense traffic on that river, Mr. Robinson reports that the cost, which is only £60,000 a year, is excessive for the traffic considering the volume of commerce benefited, and "would not be justified from purely commercial considerations." I must say that I was astonished on reading his memorandum to see that, although the dredging had been thoroughly successful, yet the cost was considered excessive for the traffic, and, what is still more amazing, the traffic instead of increasing with the better channel has steadily declined. Although the railway rates are higher, the railways are taking more and more of the traffic, so that the traffic had shrunk from two million three hundred thousand tons in 1901 to one million seven hundred thousand tons in 1906, a shrinkage of over 26 per cent. in five years, and of the traffic remaining over one million tons is coal floated down from the Ohio coalfields, this traffic not being benefited by the dredging, for the reason that it originates on the Ohio River, where the available low-draft of water is less.

The last portion of the extracts given above deserves a second quotation:—

> "The railway possesses the advantage of providing a daily service to and from all interior points, and at low rates for long distances. The water-borne traffic is certainly cheaper per ton than the railway, but the former is limited to goods that can be handled on the banks of an alluvial river whose level varies 40 feet, while the railway furnishes transport direct from the factory of the producer to the door of the consumer."

Can it be doubted that, given a direct line to the important centres of Zaria and Kano, the history of the Mississippi will be repeated on the Niger? The railway will give a daily service to and from all the chief producing centres, and, as traffic increases, at much lower rates for long distances, with the added advantage that Lagos by the time the railway reaches Kano, if the harbour works are persevered with, will be a commodious harbour, safe for the largest West African steamers and well equipped with wharves and all the facilities for quickly loading and discharging ocean steamers. Those familiar with shipping and commercial matters know what an advantage such a port must have over a port like Forcados, and ocean freights must drop where the traffic increases in volume and approved facilities for dealing with it are furnished.

I would urge upon your Lordship that, although there may be justification for building the Baro line to meet local requirements, there is no justification for in any way sacrificing the interest of the more important Lagos-hinterland line in order to give slightly better communication between Baro and Kano.

The above is written purely from a consideration of commercial advantage; but from an administrative or strategical standpoint the arguments are almost equally strong in favour of the Lagos line, for, comparing Nigeria with India, Lagos is the Calcutta and Zaria can never be more than the chief administrative station in the interior, or its Simla.

The Niger River will always be an important commercial trade route, but, like the Mississippi, only for the local trade to places on or adjacent to the river system, provided Government does not interfere to prevent trade taking its natural route.

It may be admitted that in the United States one of the chief reasons for the Government spending large sums in improving the navigation of the magnificent Mississippi waterway is to prevent the powerful railway trusts unduly raising freights on railway-borne goods so that it may not be possible for any combination of railway magnates to raise freights on the railways, because, if they do, the traffic can be diverted to the river. In Nigeria no such reason for expenditure, "which would not be justified from purely commercial considerations alone," exists because the railway belongs to the Government and the Government controls its rates.

I do not know what expenditure in dredging on the Niger is contemplated, but the annual expenditure can hardly be reduced below £5,000 a year. The present traffic on the river passing Idah was in 1907 only about 20,000 tons, inclusive of railway materials. If an expenditure of £60,000 a year on the Mississippi with the traffic of 2,306,302 tons in 1901 when dredging was commenced (or of 1,719,893 tons in 1906) is not justified commercially, is an expenditure of £5,000 justified on the Niger with a traffic of 20,000 tons?

I do not wish to appear as an opponent to the dredging of the Niger, but what I do wish to urge is that the Baro-Kano line should be considered as a branch line

and that the Lagos-Kano line should be constructed as the main line on the route which is best from Lagos to Kano and not on the route that may give a better line from Baro to Kano. Taking the Lagos line from Zungeru to the alignment proposed for the Baro-Kano line means, probably, an addition of over 30 miles to its length, for by this route on leaving Zungeru it does not begin to advance towards Zaria until after joining the Baro alignment.

I regret that there is not a Governor of the whole of Nigeria who could write with more authority on the subject than I can myself. I recognize that I am sure to be charged with looking solely to the advantage of Southern Nigeria, and I regret that it is not possible for your Lordship to have one adviser in the matter, instead of having to choose between the views set before you by two administrators. Nigeria should be looked upon as one country and not as two, and it seems regrettable that the unification of the territory under one Governor has been delayed beyond the time when important decisions on railway policy, which must have a lasting effect upon the development of the country, have to be settled.

The cost of the haulage of goods over the Lagos Railway is quoted by Sir Percy Girouard in his memorandum enclosed in his despatch of 30th of May, 1907,* as nearly 2½d. a ton mile as a reason why the Baro route should be favoured; but I would point out that that cost has already been reduced in 1908 to 1½d., and that, at the instance of the General Manager himself, we now only charge 1¼d. per ton mile on goods hauled for railway construction, and it is anticipated that the actual cost will be less. As the railway lengthens and the volume of traffic increases so the cost per ton mile steadily declines.

The following are special reasons why this may be anticipated on our railway:—

(*a*) We are now paying 37s. 6d. per ton for our coal. This most excessive rate is solely due to the existence of the shallow passage over the Lagos Bar. When that bar is deepened it can hardly be disputed that the cost will not exceed 25s. a ton and will probably be less.

(*b*) Administrative charges on a small line must be great—these are sure to become a diminishing percentage of the total expenditure as the length of the line increases.

(*c*) The extensions of the line are being built with flatter curves and grades, and works are now in progress to improve the Iddo-Ibadan section nearly up to the standard of the upper line. Haulage charges on the improved line will be greatly lessened when these works are completed.

I have, &c.,
WALTER EGERTON,
Governor.

No. 51.

THE GOVERNOR OF SOUTHERN NIGERIA to THE SECRETARY OF STATE.

(Received 9 October 1908.)

[*Answered by No. 54.*]

MY LORD, Government House, Lagos, Southern Nigeria, 22 September, 1908.

I HAVE the honour to acknowledge the receipt of your Lordship's despatch of 31st July last,† giving formal approval to the expenditure of £200,000 on the eastern mole of the Lagos Harbour Works, but demurring to any preparations being now made for the commencement of the construction of the western mole.

2. I have, as suggested in paragraph 5 of that despatch, discussed at length with Messrs. Wilson and Coode, of the firm of Messrs. Coode, Son, & Matthews, the policy to be pursued with reference to the harbour works, and I now enclose their considered opinion.

3. It will be observed that they recommend "that preparations be made to enable the western mole to be commenced as soon as the first portion of the eastern mole has been completed."

If the work on this mole progresses at the expected rate the authorised portion should be completed early in 1910, about February or March.

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* No. 16. † No. 49.

The Consulting Engineers state "about 18 months would be required after the placing of the orders to complete and erect the plant at Lagos ready for commencing to deposit stone, so that should it be decided to proceed on these lines, instructions to that effect should shortly be issued."

4. The ocean freight to Lagos is now fixed at the exorbitant rate of 35s. 9d., less 10 per cent. ultimate rebate. As soon as the bar is deepened, so that ocean steamers can safely enter, this charge would be reduced by at least 10s. In addition to this the transhipment at Forcados doubles the period between shipment and delivery, and constant and extensive damage is suffered by goods from the rough handling and exposure to weather at Forcados.

5. Every month by which the opening of the bar is delayed means heavy additional expenditure by Government and by the commercial community.

6. Any cessation in the continuity of the work must necessarily considerably increase the expense owing to the dispersion of a labour force—European and native—the men in which have acquired knowledge of the special work and its requirements, and to the rapid deterioration of machinery, tools, and buildings from disuse in this climate.

7. Messrs. Coode, Son, & Matthews in 1898 drew up a complete scheme, the carrying out of which they advised will result in the establishment of a deep entrance.

As I understand the matter, the policy that has been adopted is to carry out so much of that scheme as may be proved necessary to secure this deep entrance, but to endeavour to secure it without carrying out the whole scheme, and, by the employment of dredgers, to anticipate and assist the deepening that may be expected from the construction of the moles.

8. The engineers advise that the construction of some portion of the western mole is essential to the success of the works, and they give reasons for their opinion.

9. Messrs. Wilson and Coode have been specially commissioned to advise on the subject of further wharfage accommodation for ocean steamers in anticipation of the arrival of the railway at Kano and of the opening of the harbour entrance, and their proposals just received contemplate new expenditure of more than £500,000. It is useless considering any such scheme if the works requisite to ensure a deep passage over the bar are not pushed on to completion. Fortunately the financial position makes the expenditure required no cause for anxiety.

10. I again ask for your Lordship's approval now to the expenditure of the £16,000 required for the works preliminary to the commencement of the western mole, leaving the amount to be expended on the first portion of that mole to be decided later.

I have, &c.,
W. EGERTON,
Governor.

Enclosure in No. 51.

YOUR EXCELLENCY,

WE have carefully considered this question and are convinced that the construction of the western mole is essential to the success of the works at the harbour entrance. Owing to the heavy seas which prevail from the westward, the sands at the harbour mouth are in constant motion, and, in our opinion, the shelter which would be afforded by the western mole is essential for the fixing of any deep-water channel which may be formed through the bar. This shelter will also be necessary for the protection of the outer portion of the eastern mole and of vessels entering the harbour during stormy weather.

We have looked into the question of the progress of the eastern mole work with Mr. Wilson, the Resident Engineer, and are of opinion that if the stone traffic can be developed and maintained as anticipated, the portion of the mole now sanctioned, say about 5,300 feet in length, should be completed towards the middle of 1910.

We have every confidence that the works when fully completed will, in conjunction with the dredging operations now commenced, prove successful in maintaining a navigable channel for ocean-going vessels. A large sum has already been expended in plant and materials for the purpose of carrying out the work. A staff has been organised and accommodation for the same provided. Should the work be suspended

when the first portion of the east mole has been completed, the plant would be laid idle and quickly deteriorate, the staff would be broken up and need to be re-organized again at some future date. This would be very detrimental to the works and involve large additional expense. For these reasons we should not advise any break in their prosecution.

In our report of June, 1898, we expressed the opinion that "it is only by the execution of the works on both sides of the entrance that a continuous improvement can be effected in the depth to such an extent as to admit of the regular coming to the port of mail and other steamers," and we see at present no reason for modifying that opinion. We would therefore recommend that preparations be made to enable the western mole to be commenced as soon as the first portion of the eastern mole has been completed.

For this purpose it would be necessary to erect upon this western shore a wharf for unloading stone, and to provide two 12-ton cranes, one locomotive, and 16 wagon bodies and stone-boxes, together with sufficient railway material for the laying of the necessary sidings, &c., the cost of which we estimate at £16,000.

About 18 months would be required after the placing of the orders to complete and erect the plant at Lagos ready for commencing to deposit stone, so that should it be decided to proceed upon these lines instructions to that effect should shortly be issued.

No further rolling-stock for main-line or floating plant would be required, as it is not proposed, in the first instance at any rate, to increase the quarry output of four trains per day, as at present arranged for.

It is not possible at this period to determine exactly to what extent either the west or east mole should be finally carried out. This will of necessity be determined as a result of carefully-recorded observations, during construction, of their effect upon the channel and currents.

COODE, SON, & MATTHEWS.

14 September, 1908.

No. 52.

BARO-KANO RAILWAY, NORTHERN NIGERIA.

PROGRESS REPORT FOR THE HALF-YEAR ENDING 30TH JUNE, 1908.

(Received in Colonial Office, October 16, 1908.)

1. On receipt of the following cablegram from the Secretary of State for the Colonies, dated the 8th August, 1907:—

> "It has been announced in Parliament that construction of railway Baro-Kano sanctioned, and also extension of Lagos line to Zungeru *vid* Jebba,"

orders were given by His Excellency the High Commissioner to submit indents for railway materials and stores, the list of first requirements and stores having been already prepared in accordance with the proposals agreed on, viz., the construction of a pioneer line on the 3 feet 6 inches standard gauge with a rail weighing 45 lbs. to the yard.

2. Except for previous investigations into the practicability of improving the gradients on the alignment surveyed by a party under the direction of the consulting engineers, a reconnaissance from Zungeru down the Moya Valley, and a small quantity of earthwork for a possible road at Baro, arrangements for survey had to be initiated, and construction following immediately after put in hand. The only surveyor available for work in the country, Mr. A. S. Collard, was working practically single-handed, so that he was only just able to keep ahead of a large earthwork gang recruited locally under Captain J. H. Burnside. A road construction gang under Mr. A. Graham, District Engineer, carried out the heavier banks and cuttings from Baro to Kacha. Another earthwork section, under Mr. E. C. Duff, was organised on the 11th of October, and a third under the same officer on the 9th of November at mile 43, but he was shortly compelled to proceed home on leave through illness.

3. His Excellency the High Commissioner, accompanied by the Director of Public Works, an Assistant-Secretary, and the Aide-de-Camp, arrived at Choiwa

Angulu on November 6th, 1907. This station, selected by Mr. E. C. Duff under His Excellency's instructions, is situated with regard to the bend in the river valley and, therefore, the railway alignment, so as to be central, within a reasonable distance of either end of the first sixty miles, and on high ground about four miles away from the river valley. The success of the site from a health point of view has justified its selection.

Survey.

4. Survey operations with a view to discovering whether a valley line was feasible at a reasonable cost were then undertaken under the supervision of His Excellency, who left for Zungeru on December 14th, 1907. Messrs. R. J. Church and D. Gaskin arrived for survey work by the middle of December and other officers in January, 1908. Mr. Collard's survey party was reinforced by a Public Works Department stonemason, a fitter, and a sergeant from the West African Frontier Force—all of whom had to be trained. Cables were sent to the High Commissioner of South Africa asking for assistance in the way of surveyors, and the first batch left Cape Town on the 30th December, 1907. It was not possible until their arrival, at the end of February, to organise a proper system of survey with a preliminary reconnaissance and paper location party in front, the staking out party following. Though it is possible that a better line might have been secured with laborious and lengthy investigation, a glance at the longitudinal section will show that except near Kodoko, mile 83, a steady rise has been maintained and practically no height once gained has been lost.

5. The staking out of the first fifty miles was completed on the 5th February. The following table shows rate of progress of survey parties:—

——	Previous to January, 1908.	January.	February.	March.	April.	May.	June.
Paper location ..	0 to 50		50–72, 22 miles.	72–90, 18 miles.	90–110, 20 miles.	110–121, 11 miles.	121–144, 23 miles.
Final location ...	0–33	33–49, 16 miles.	49–58, 9 miles.	58–75, 17 miles.	75–88, 13 miles.	88–100, 12 miles.	100–114, 14 miles.
Average number of engineers employed on survey.	2	5	10	12	10	11	12

A detailed survey had to be made in February of the Patatifi Bluff, a steep clay bank, on the side of which a bench had to be cut for the railway.

6. With gradients of 1 in 50 or 1 in 75 there would have been no difficulty in securing a surface line. The problem before the survey parties, as laid down by His Excellency, was to follow the Bako Valley with fully compensated gradients of ·70 up and ·60 per cent. down; the easier grade being in the direction of the bulkier and heavier load, the minimum curve being 6 degrees. Mr. A. S. Collard, by untiring efforts, aided by a party of young engineers, who have worked with enthusiasm, has succeeded in obtaining these gradients without exceptionally heavy work for the first hundred miles, and Mr. Church's careful work on location has left nothing to be desired.

7. The line is being considered for the present as approximately four engine runs of 100 miles each; (1) mile 0-100, Bako Valley section; (2) mile 100-200, Bako-Kaduna section; (3) mile 200-300, Kaduna Valley section; (4) mile 300-400, Kano section. In the second hundred miles the standard of gradient has been altered to 1 per cent. up and ·90 down, with the sparing use of 8° curves fully compensated.

Reconnaissance.

8. Two reconnaissance surveys have been made: (1) by Captain H. N. Kempthorne, Intelligence Officer, assisted by Mr. A. J. Dolman, foreman of works; and (2) by Captain H. Gwynne Howell, R.A., assisted first by Lieutenant P. R. Worrall, 1st Northern Nigeria Regiment, and later by Mr. W. FitzHenry, Assistant-Engineer.

Captain Kempthorne's work, which, while furnishing the Protectorate with a contoured map, has assured us of the possibility of obtaining a ·6 gradient both

ways, deals with the country between Zaria and Kano. Captain Kempthorne arrived at Zaria on the 14th February and completed his traverse to Kano, arriving at the latter place, 98 miles distant, on the 25th April. Captain Gwynne Howell left Zungeru in February, returning to military duty at the end of May. In this period he ran a traverse through, and submitted contoured plans of, the difficult section between Kokuru and Kodondo. It is now definitely known that the line must pass between the Koduru Hills and the Kaduna, the former practically rising out of the latter valley and stretching away from the valley without a break. A detailed examination was made of the left bank of the Kaduna and much rough country was met as far as Kodondo. Beyond this, the country is easy to Kurimi-n-Kaduna. An examination of the right bank of the river upstream from Koduru must be made before a line is finally decided on.

9. Records of grade and curve books, besides the usual plan and sections, have been preserved in the Drawing Office at Choiwa Angulu. By the use of per cent. gradients, degree curves, and 100-foot chains much labour has been avoided.

Earthwork.

10. The banks have been made up to a full width of 16 feet and the cuttings 18 feet, including side drains, or 12 feet between inner edges of drains. The additional cost of banks will be more than repaid by the saving in maintenance and ballast. The cuttings have all been sloped and drained, this being work which can cheaply and easily be done on construction, but only with great expense and difficulty afterwards. So far, except in a few isolated cases, only sand, clay, and soft rock have been dealt with. None of the earthwork has been exceptionally heavy except at the Patatifi Bluff (where the length of the slope of cutting on one side is nearly 40 feet) and the embankment across the Ebba Valley.

11. Work was originally begun with a gang under Mr. Graham of about 1,200 men (Yorubas, Hausas, and Nupes), and I, personally, in the light of past experience, looked upon a local labour supply as impracticable, or, if obtained, unreliable. The first gang of men recruited from the Bida Province was organised under Captain J. H. Burnside, District Superintendent of Police, on the 9th October, 1907, and the success of this local labour supply is an excellent proof of the success obtained by the Government of the Protectorate in its policy of administration through native rulers. Local labour is paid at the rate of sixpence a day, and recruiting charges on a scale of £2 17s. 0d. per 100 men per month are being incurred. The local labour gangs work under the direct supervision of Political Officers who, practically acting as contractors, deal with the men through their village heads, thus ensuring that continuity of native rule which is so essential in dealing with the native. To assist the Political Officers in laying out work three or four foremen are attached to each section, and it is particularly noticeable that no cases of ill-treatment of natives have occurred.

12. The earthwork gangs were dependent for tools on the slender resources of the Public Works Department of the Protectorate. Large numbers of native-made hoes were used, and the tinned basins which are largely sold by traders to natives were purchased for earthwork, it being impossible to secure a large quantity of strong baskets locally. The West African native takes readily to the basket system for earthwork. He is accustomed to carrying loads on his head, and, though I hear that experiments with wheelbarrows were successful in Liberia, I would not advocate their use here. The shortage of tools towards the end of the half-year has become a serious matter, many of the pickaxes being worn down to a projection a couple of inches long from the shaft socket, and the new supply indented for in February has not yet begun to arrive.

Labour.

13. Mr. H. S. Goldsmith, Resident, Niger Provinces, has furnished the following figures, showing the local labour employed throughout the railway (average daily attendance):—

January	February	March	April	May	June
2,426	4,364	4,822	3,820	4,264	4,362

In April, a number of men were allowed to leave to attend to their farms.

14. On the 21st of May a notable departure was made by the employment

of Gwaris on earthwork. It has only recently been possible for Political Officers to get into close touch with these people, the first labour experiment tried being that of carrying telegraph poles. The timidity and suspicion which characterised their attitude at first has now disappeared and they work cheerfully in large gangs to the sound of their trumpets and drums. This result, obtained without the employment of a soldier or policeman, is a tribute to the personal influence of the officers working with Mr. Goldsmith, the Resident.

15. Imported labour when used for earthwork was employed on piece work, but it has been found, when dealing with new local labour, better to pay them daily and set a task according to their capabilities.

16. Exclusive of Baro Yard, there were 75·4 miles of earthwork, aggregating 958,640 cubic yards, and costing £17,631, or £233 per mile. The average cost of earthwork works out to 4·4d. per cubic yard.

17. With unskilled labour of this nature much supervision is necessary to give profiles for banks and set out slopes of cuttings to ensure neatness.

At first, by permission of the Commandant of the Northern Nigeria Regiment, the services of four non-commissioned officers of the Northern Nigeria Regiment were lent to the railway to supplement the foremen transferred from Public Works, and other non-commissioned officers were appointed on probation. It is expected that, under instructions from the Army Council, they will have to rejoin their regiments, and, though this is unavoidable, the loss of their services will be greatly felt.

18. The earthwork has proceeded so far well in the face of many difficulties. The Emir of Bida formally inaugurated construction work at a ceremony at which His Excellency the High Commissioner, the Political Officers, and officers of the railway were present, on the 7th January, 1908.

Baro Yard.

19. The terminus of the Baro-Kano Railway on the Niger is situated in a horseshoe formed by the hills abutting on the river. A considerable quantity of earthwork has been completed, viz., 62,000 cubic yards, at a cost of £1,331 12s. 6d., and stacking grounds, as large in extent as the limited ground provided will allow of, laid out. The main line and one siding have been laid, a goods platform and three goods sheds built, besides an oil and cement store. The ground at the foot of the hill has been reserved for traders and native railway employés. A jetty is in progress of erection at the foreshore. The slope of the bank has been revetted as far as it is complete.

20. Buildings for European staff have been erected on the slopes and on the plateau of Baro Hill. It is feared that some time must elapse before Baro can be rid of its mosquitoes and biting flies. Horses cannot live at Baro on account of the prevalence of tsetse.

21. Offices for the Chief Construction Storekeeper and the Chief Construction Accountant and the Printing Office have been built, as well as two two-room houses for the Accounts Staff. A two-room house on the slope and other houses, including one for the Director of Railways, the Chief Construction Storekeeper, and the Chief Construction Accountant, are in course of erection. A former office is used as a European hospital, and temporary quarters have been erected for the Officer Commanding and the non-commissioned officers and men of the detachment of Royal Engineers who are to be sent out for work on the railway.

22. Traders' sites, though necessarily on short leases, are being given out. The native town has been shifted downstream.

23. The labour so far employed in handling heavy material has been imported, but the heavy earthworks in the Yard, carriage of bricks, &c., has been done by local labour recruited from Agaie by Mr. A. M. Lafone, Resident, Baro, and from the Trans-Niger Provinces by Major H. D. Larymore, C.M.G., Resident, Lokoja.

Bridges.

24. Some progress, though necessarily slow, on the bridges in the first twelve miles has been made. Wells of stone masonry, in cement, sunk on wooden curbs, are used in places where the streams have a sandy bed and contain water. Open foundations were secured at the Bakogi for the main span of 100 feet, and the

masonry of the two piers is above flood level. Work on this bridge and the Ebba, each requiring about 250 feet of waterway, has been stopped by floods.

25. It is proposed to use masonry piers in the case of spans 40 feet and over, and steel trestles filled with concrete for 15 and 20 feet spans. Three types of the latter have been obtained for various heights of bank; the lightest type, consisting of two 18-inch cylinders, being buried in the bank to form a pier abutment. Corrugated iron culverts are used for smaller spans, the weight on these being relieved by old rails in dry stone walls in the bank.

26. The non-arrival of cement for foundations practically stopped bridge work throughout the last dry season. Nodular carbonate of lime—the kankar of India—has been found between Zungeru and Zaria and a small quantity at Kano, so that it is hoped similar deposits may be found on the railway. It is, however, easily shown that in a country where head transport is employed such a discovery would be useless if the limestone were not found on or very near to the line of railway.

27. Diversions and low crib bridges at openings will shortly be begun to facilitate track-laying where permanent bridges are in progress.

28. The stone obtained for bridge masonry so far has been laterite and sandstone, the latter of poor quality, and the carriage of this by head entails a considerable lead. Except at Baro, there is no quarry on the line until an outcrop of laterite is reached near mile 65.

Permanent Way.

29. Under the orders of the Secretary of State for the Colonies a consignment of rails and sleepers, as under, indented for the Lagos Railway, was diverted to Baro and landed in September and October, 1907, viz.:—

Rails (55 lbs.)	3,334
Sleepers	19,860

Instructions were given to lay this material in Baro Yard and as far outside as practicable, allowing eleven sleepers to the 55-lb. rail in Baro Yard and ten sleepers in the track outside the Yard.

30. For the pioneer line, twelve sleepers per 30 feet 45-lb. rail have been provided. Six and a half miles of the heavier material has been laid with light crib bridges at openings.

Rolling Stock.

31. To assist in shifting material newly-landed, a Class I. Lagos Railway shunting engine was ordered with ten trucks, and these are now being erected.

The total rolling stock under order is:—

2 Class I. Lagos Railway shunting tank engines.
2 Class 51 Lagos railway six-wheeled coupled engines.
3 Class 103 Lagos Railway eight-wheeled coupled engines.
5 Cape engines (a modification of Cape Class VII. eight-wheeled coupled, with 9½ tons axle load).
8 brake vans.
100 trucks (bogie).
3 carriages.
2 breakdown 10-ton cranes.

Stations.

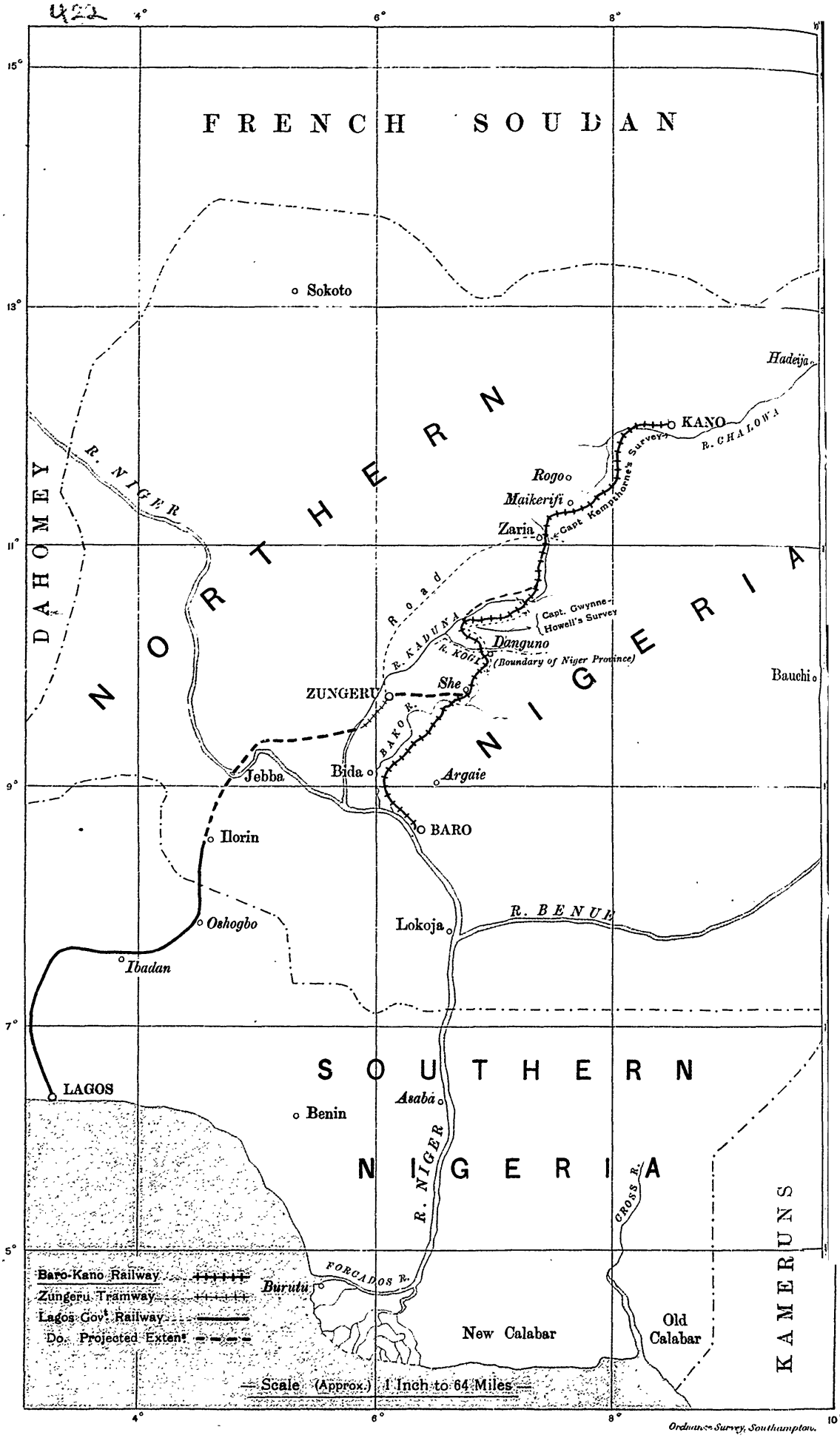
32. Provision is being made for crossing stations consisting of one construction siding with the minimum amount of earthwork every 5 or 6 miles after mile 50, and stopping stations depending on local conditions at intervals of about 10 to 14 miles.

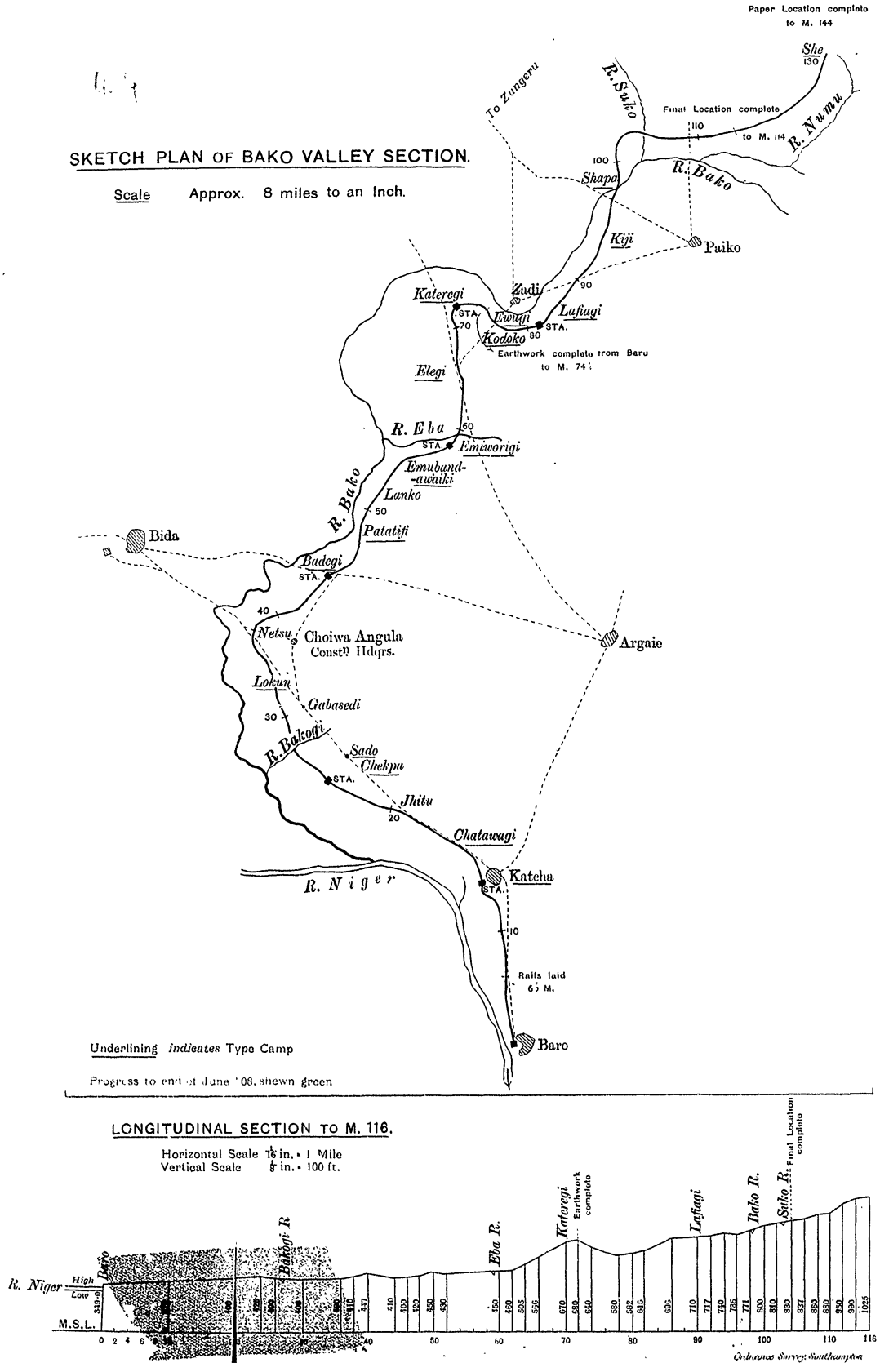
Temporary Quarters.

33. Type camps have been built at, roughly, five miles intervals up to mile 100. This consists of thatched huts with mud or thatched walls, and have proved invaluable as refuges from sun and rain.

Mosquito-proof wire netting shelters were at first sent out to camps, but these will not stand much moving about in wooded country.

At Choiwa Angulu and Baro, the mosquito-proof shelter, fixed or portable, has proved a great success, the use of mosquito curtains being dispensed with. A





bed can be placed in one of these rooms, which is usually covered with a steeply pitched thatched roof built over it after it has been placed in position on the ground.

TRANSPORT.

34. Owing to the prevalence of tsetse, animal transport, whether pack or draught, cannot be used, and loads, including cement for bridges, have had to be carried on men's heads. The Bako River has been cleared by the river population under direction of the Resident, and it is hoped that much saving will be effected by using native canoes and the steam canoes of the Protectorate Marine Department.

35. Horses belonging to the Staff have everywhere been sick, and many have died, except at Choiwa Angulu, where they have kept to a great extent free from horse sickness.

STAFF.

36. A statement* showing distribution of the European Staff is attached.

Mr. Longhurst, Executive Engineer, Public Works Department, took over charge of construction on the 10th February, the Director of Railways proceeding on leave by the boat leaving Burutu on the 17th February, 1908.

Mr. A. P. Tomsett, Accountant, Public Works Department, acted as Chief Construction Accountant from the 8th October, 1907, to the 16th December, 1907, when he proceeded on leave, returning on the 13th June, 1908, and took over charge from Mr. C. A. Cuningham, pending the arrival of Mr. Oliver H. Ellis, Chief Construction Accountant.

Mr. C. A. Cuningham, Assistant Treasurer, acted as Chief Construction Accountant, from the 11th December, 1907, to the 20th June, 1908.

Mr. M. Liddard, Assistant Resident, acted as Chief Construction Storekeeper, from the 1st January, 1908, to the 18th February, 1908. Honorary Lieutenant D. Lees took charge of this office on the 13th February, 1908.

The Political Officers who have worked in connection with the railway are:—

Captain J. H. Burnside, District Superintendent of Police.
Mr. E. C. Duff, Resident.
Mr. A. M. Lafone, Resident.
Mr. R. N. Pike, Assistant Resident.
Captain J. Ff. Hopkinson, Assistant Resident.
Mr. H. S. W. Edwardes, Assistant Resident.
Mr. D. A. Vanrenen, Assistant Resident.

LOCAL TIMBER.

37. In October, 1907, the Resident, Mr. E. C. Duff, aided by a few native carpenters, cut out a piece of wood eight or nine feet in length and about 10 inches by 6 inches in section from a log at his headquarters, near Lokun. This proved the beginning of an industry—the production of wooden railway sleepers adzed from local timber. At first the natives, not having been trained to understand straight lines, produced pieces of wood, many of them shapeless, but lately the sleepers turned out have been most creditable and fit to be used in any railway. The total number made to the end of June is 5,093, for which £423 18s. 6d. has been paid. The railway crosses a swampy forest, or Kurumi, at Jhitu (mile 18), where there is much valuable timber. The experiment of getting out expert lumbermen was tried in January, 1908. Two axemen arrived from Canada, Messrs. Meilleur and Bergeron. The former got continuous low fever and had to leave, but Mr. Bergeron has kept his health and worked with marked success. He has scientifically laid out the forest with cleared ways in various directions, leading to the main track where timber is rolled and collected ready for the mill. It has been proposed to erect a sawmill at Jhitu, but it is not far removed above Niger high flood and the health of Europeans living there is a matter requiring further investigation.

SLIPWAY.

38. A slipway was contemplated in connection with the Protectorate workshops to carry out repairs to marine vessels at Baro, and the revetted slope, made at a small cost, has proved useful for discharging vessels. The subaqueous work in constructing a slip in a river with a rise and fall of 24 feet would involve great expense.

* Not printed.

ROYAL ENGINEERS FOR RAILWAY.

39. The Colonial Office, at the request of His Excellency the Governor, entered into an arrangement with the Army Council for the services of three officers and thirty non-commissioned officers and men of the Royal Engineers for discharging vessels at Baro, erecting engines and rolling stock, and working trains.

Captain H. O. Mance, D.S.O., the Officer in Command, with ten non-commissioned officers and men, leave England in July, Lieutenants Hammond and Maxwell with ten men leave in October, and the remaining ten men in February. This employment of Royal Engineers is alike useful to their corps on account of the experience obtained and enables the Protectorate to secure the services of a number of trained European mechanics under discipline.

HEALTH.

40. The health of the Europeans on construction has, this year, so far proved good on the whole. One death occurred, that of Mr. E. Winterson, foreman of works, on the 22nd of March, 1908. There have been two cases of blackwater fever and invalidings, but the improvement is most marked, especially at Baro, where, during the rains of 1907, everyone there, some of whom had been in the country for years without illness, had more or less severe fever. The railway staff owe much to the unremitting efforts of Doctors Chartres and Blair, Senior Medical Officers of the Protectorate.

JNO. EAGLESOME,
Director of Public Works and Railways,
Northern Nigeria.

No. 53.

COLONIAL OFFICE to CROWN AGENTS.

GENTLEMEN, Downing Street, 16 October, 1908.

WITH reference to the letter from this Office of the 14th of September,* regarding the question of bridging the southern channel of the Niger at Jebba, I am directed by the Earl of Crewe to inform you that the Governors of Northern and Southern Nigeria both consider a headway of 25 feet above high water level sufficient and an opening span unnecessary. Lord Crewe approves of your obtaining an estimate of cost and detailed designs on this basis. A footway should presumably be provided for as in the case of the bridge across the northern channel.

I am, &c.,
R. L. ANTROBUS.

No. 54.

THE SECRETARY OF STATE to THE GOVERNOR OF SOUTHERN NIGERIA.

SIR, Downing Street, 5 November, 1908

I HAVE the honour to acknowledge the receipt of your despatch of the 22nd of September,† relative to the works and plant required as a preliminary to the construction of the western mole at the entrance to Lagos Harbour.

2. You state in the 7th paragraph of the despatch: "As I understand the matter, the policy that has been adopted is to carry out so much of that scheme as may be proved necessary to secure this deep entrance, but to endeavour to secure it without carrying out the whole scheme, and, by the employment of dredgers, to anticipate and assist the deepening that may be expected from the construction of the moles." The view expressed in this passage is correct, and I accordingly approve of the expenditure of the sum of £16,000 on the preliminary works and plant required for the western mole.

3. Messrs. Wilson and Coode observe in the concluding paragraph of the report of which a copy is enclosed in your despatch: "It is not possible at this period to determine exactly to what extent either the west or east mole should be finally carried out. This will of necessity be determined, as a result of carefully recorded observations, during construction, of their effect upon the channel and currents." I shall be glad to be kept duly informed as to these observations, which will, I presume, include careful statistics as to the results achieved by dredging.

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* Not printed. † No. 51.

4. Copies of your despatch and of this reply have been sent to the Crown Agents for their information and that of the Consulting Engineers.

I have, &c.,
CREWE.

No. 55.

THE GOVERNOR OF SOUTHERN NIGERIA to THE SECRETARY OF STATE.

(Received November 7, 1908.)

Government Bungalow, Ibadan, Southern Nigeria,
14 October, 1908.

MY LORD,

I HAVE the honour to forward herewith 12 printed copies of Messrs. Coode, Son, & Matthews's report, on the proposed wharfage scheme for Lagos Harbour. It will be observed that the scheme they favour is that of bringing the railway over from Iddo to the Marina, and the establishment of large wharves and warehouses there with a small coaling station in the vicinity of Wilmot Point, near the entrance of the harbour.

2. On the 7th instant, I held a meeting of the Lagos Chamber of Commerce. I enclose a list of those present, and a copy of the notes of the proceedings. I read Messrs. Coode, Son, and Matthews's report to the meeting, and explained the scheme generally. I also again drew attention to the other alternative proposals. All present voted in favour of the adoption of Scheme No. II. (for wharves on the Marina) with the exception of Mr. Osborne, Agent, Messrs. Paterson Zochonis, & Co., who advocated Scheme No. III. (for wharves in the vicinity of Wilmot Point).

3. The following suggestions were put forward:—

(*a*) That the sheds at the new wharves should be so arranged that each main line steamer of an approximate length of, say, 450 feet could be berthed opposite a shed.

To effect this it would merely be necessary to have the space between each shed 100 feet in lieu of 30 feet. If this proposal is adopted I would suggest that this 100 feet space should be sheltered by a light roof.

(*b*) Possibility of having goods carried on elevated road or ropeway between wharves and merchants' warehouses on the Marina;

(*c*) The provision on the wharf of a bonded warehouse for the storage of spirits.

Several members considered this essential. It seems to me that it could adequately be provided by partitioning off a portion of one or more of the proposed large warehouses. Probably open wire collapsible partitions would be the best type to adopt.

(*d*) The setting apart of one-half of each warehouse for import and the other half for export goods.

(*e*) Some arrangements by which canoes could continue to approach the Marina opposite the wharves and land their cargoes thereat.

As regards (*e*) I intimated that canoes would be able to go alongside the wharves where not occupied by steamers. The merchants expressed the opinion that this is essential as a great deal of the palm oil is brought to Lagos in canoes, and the present private wharves are chiefly maintained, and supplied with cranes, in order to haul up and land there heavy casks of oil from the canoes.

4. On the 12th instant a further meeting was held at Government House at the request of the unofficial members of the Legislative Council. At this meeting the official members were also present. The General Manager of the railway, and Mr. Bonell, the Locomotive Superintendent, now acting as Deputy General Manager, Mr. A. A. Cowan, of Messrs. Miller Brothers, who was unable to attend the previous meeting with the Chamber of Commerce, also attended. Messrs. Wilson and Coode, who had arrived in the morning from Accra, also attended.

5. I enclose notes of the proceedings, from which it will be seen that all present with the exception of Mr. Little, favoured the carrying out of the Marina Scheme, subject to the General Manager being satisfied that the space provided for railway purposes is adequate. On this point Mr. Glasier expressed a desire to further examine the plans at leisure while expressing the opinion that the arrangements were probably sufficient.

6. It will be observed that the question of the immediate purchase of a large

floating dock was raised by Mr. Sapara Williams. My views on this point are well known to your Lordship, and I have always regretted the decision in, I think, 1905, cancelling the approval that had shortly before been given to the purchase of a Government Dock owing to the establishment of a private dock at Forcados.

7. I recommend that the scheme be now submitted to the Joint Committee of the London, Liverpool, and Manchester Chambers of Commerce, and to the West African Trade Association, and that, subject to no serious objection being raised by those bodies, instructions be given to Messrs. Coode, Son, & Matthews to carry out the detailed surveys and investigations required, to supply a reliable estimate of the cost of its execution, and that they be further instructed, in consultation with Messrs. Elliot, Cooper, and Shelford, to submit a detailed estimate of the cost of the proposed railway bridge, from Iddo to Lagos Island, such estimate to also include the cost of providing for road, foot, and wheel, traffic over the same bridge either by widening it or by arranging for the road and foot traffic passing on a higher level.

8. The utilisation of the Iddo Wharf, with the extension now being erected, as the approach to the bridge on the Iddo side appears to me worthy of careful examination, and its adoption would minimise the dislocation to traffic and inconvenience which are unavoidable whilst the works are being carried out; it will also facilitate the continued use of the warehouses and sidings now used by the merchants at Iddo.

9. It may be desirable to provide, as proposed by Messrs. Coode, Son, & Matthews, an ultimate depth of 30 feet at the new wharves; but the lesser depth of 26 feet is likely to be amply sufficient for the West African trade for very many years to come, and I should think myself that, if ships drawing more than this depth are introduced into this trade route, it would be preferable to provide for their berthage near the entrance to the harbour at wharves near Wilmot Point. Still, if the detailed estimates show that the deeper foundations required for a 30 feet frontage would not materially add to the expense, I recommend that they should be adopted.

10. In submitting this scheme to your Lordship I wish to point out that during the carrying out of the works very considerable inconvenience must necessarily be felt by the mercantile community, and also by other classes in Lagos. I would, therefore, urge that due provision may be made for their execution with the utmost celerity, and that the long delays that have taken place in the construction of the Iddo and Customs wharves extensions may be avoided.

11. Further, I would again draw attention to the fact that the necessity for, and even the utility of, extensive wharfage with deep water frontage depends entirely upon the removal of the "bar," and that the approval of the visit of Messrs. Coode, Son, & Matthews, in order to prepare a scheme for these wharves, implies the decision to push on continuously with the works that may be required to deepen the entrance from the sea, even should it prove necessary that the complete scheme submitted by Messrs. Coode, Son, & Matthews in 1898, and estimated to cost £897,000, should be executed.

12. As to the financial question, I have no hesitation in assuring your Lordship of the ability of the country to meet the annual charges entailed by the whole expenditure that may be required to carry out the two schemes; whether debt charges are partly recovered by dues levied on the shipping or wholly thrown on the general revenue, and the indirect receipts to be expected from the development of the trade of the port relied on to sufficiently reimburse the Treasury.

I have, &c.,
WALTER EGERTON,
Governor.

Enclosure 1 in No. 55.

PROPOSED WHARFAGE.

YOUR EXCELLENCY, Lagos, 17 September, 1908.

WE have the honour to transmit herewith our report upon the proposed wharfage accommodation accompanied by three plans* showing the works as recommended, and alternative proposals.

Attached to each plan is a spare uncompleted copy upon which no works are shown. It was arranged that these spare copies should be completed at the Intelligence Office so as to agree with the finished copies.

* Not reproduced.

In forwarding these documents we have to record our sense of the kindness and courtesy extended to us by your Excellency in affording us the means of obtaining the information necessary for their preparation.

We have, &c.,
COODE, SON, & MATHEWS.

His Excellency
the Governor,
Lagos.

PROPOSED WHARFAGE ACCOMMODATION AND RAILWAY TERMINUS.

YOUR EXCELLENCY, Lagos, 17 September, 1908.

WE have the honour to acknowledge the receipt of certain correspondence under No. C.S.O 176/8 which has taken place between Your Excellency and the Secretary of State, together with reports from the Director of Marine, Commercial Intelligence Officer, and the General Manager of the Railway, for our consideration in connection with the above subject, for which we are much obliged. We have also received for perusal in this connection further documents contained in despatch dated 6th February, 1908, Ref: R330/1908 and S. of S. Despatch dated 1st April, 1908.

2. Since our arrival in Lagos, on 31st ultimo, we have carefully considered these documents, and have also had the opportunity, upon the ground, of looking into the various questions involved and have had the further advantage of conferring with the Heads of the Government Departments affected and also with representatives of several of the principal mercantile houses and shipping companies. We have also been enabled to attend a meeting of the Chamber of Commerce convened at Government House at which the question was discussed.

Alternative proposals.

3. The proposals upon which the opinions of the Chamber of Commerce and of the gentlemen above referred to were invited were embodied in a memorandum drawn up by the Governor as follows, the objects being:—

(*a*) To provide adequate wharfage for the present and future trade of the port, including berthage for large ocean steamers as soon as the removal of the bar allows their entrance; and

(*b*) to give railway communication with those wharves, by one of the following alternatives:—

(I) Extending railway to Apapa and providing wharfage there.

(II) Providing wharfage at Marina—commencing at Customs and extending as required—including bringing railway to the wharves.

(III) Providing wharfage in vicinity of Signal Station and Wilmot Point, erecting warehouses there and extending railway to these wharves.

(IV) Adopting Scheme II. and at the same time providing a subsidiary wharf at or near Signal Station for large mail steamers remaining only a short time and not desirous of proceeding up the harbour to Customs.

Scheme No. I.

4. Opinions, without any exception, were averse to this proposal. It was pointed out that very great inconvenience would ensue to merchants on account of the wharves being completely cut off from all direct land communication with their places of business thus involving much expense in keeping up separate offices and staff. Moreover, the removal of a large proportion of business to Apapa would seriously diminish the value of property in the island. This scheme has the further disadvantage of necessitating the dredging and maintaining of a deep-water channel across the Marina shoal. This would involve a large amount of extra dredging in the first instance in order to obtain the required depth of water, and would also, in our opinion, be likely to necessitate a very considerable amount of annual dredging in order to maintain that depth in the channel. The principal advantage of this scheme is that it would be possible to provide direct communication with the Colonial railway system without the necessity of constructing a costly railway bridge across the lagoon from Iddo to Lagos Island. We consider, however, that the advantages of this scheme are far outweighed by its disadvantages, and we are consequently unable to recommend it for adoption.

Scheme No. III.

5. This scheme, which contemplates the formation of the wharves between Five Cowrie Creek and the Signal Station, has many points in its favour. The site has the natural advantage of being near to the entrance to the lagoon, thereby rendering it easier of access to vessels entering the port, the depth of water is considerable, thus reducing the amount of dredging necessary, whilst on the landward side of the wharves there is practically unlimited space for the erection of warehouses, and the formation of a railway terminus with sheds, sidings for marshalling trains, and whatever else might be considered requisite for dealing with a large and increasing traffic. For the reasons above enumerated the Director of Marine and the General Manager of Railways have expressed themselves in favour of this site. Of the mercantile representatives whom we interviewed personally, only one favoured this proposal, his preference being on account of the ample space available for extension and development. We understood at the meeting of the Chamber of Commerce to which reference has already been made that its members were about equally divided between this scheme and No. II. (for providing wharfage along the Marina) those who were in favour of this scheme being in some doubt as to whether Scheme II. would allow of sufficient space for warehouses and railway sidings.

6. The adoption of this scheme would involve, as compared with scheme No. II., to be described hereafter, the provision of from 2 to 2½ miles of additional railway and the construction of a railway bridge over Five Cowrie Creek, but as some set off against this, there would be a saving in the amount of dredging required. As the type of construction to be adopted for the quays would in all probability be practically the same in either case, it may be assumed that there would be no great difference in the cost of the wharves whichever scheme were decided upon. This scheme (No. III.) has the disadvantage, that the wharves would be removed to some distance from the business quarter of the town, a disadvantage which was pointed out by several gentlemen with whom we had interviews and which, in our opinion, constitutes a distinct, though not insuperable, drawback to its execution.

Should this scheme be adopted, it is probable that motor-lorry services would be instituted for dealing with goods and produce to and from Lagos itself as distinct from the up-country trade carried by the railway direct. This would necessitate the remaking of the roads and their maintenance in a manner suitable for heavy traffic. It would also in all probability be necessary to lay special lines of railways with sidings, in addition to the through main line, in order to assist in dealing with purely local traffic. This question as to the best method of dealing with this traffic, as distinct from up-country traffic, would require careful consideration before finally adopting this scheme.

Scheme No. II.

7. Upon full consideration, this scheme, which provides for the construction of wharves along the front of the Marina commencing from the south-eastern end of the extension of the Customs wharf about to be constructed, and reaching down the lagoon, commends itself to us as that most likely to meet the requirements of the case.

8. The wharves and warehouses will be situated in the immediate vicinity of the merchants' offices and stores as at present existing. A large business is carried on with the natives at their markets situated on the shores of the lagoon between the Customs wharf and Carter Bridge, the produce being brought to these markets by canoe, and it is of importance that the merchants' offices should be within easy access of these markets. By placing the wharves in the position proposed under Scheme II., the merchants' offices will remain, as at present, within easy access of the native markets, and will also be in close proximity to the wharves, considerations which, in our opinion, are of the greatest importance in dealing with the business aspect of the question.

9. With regard to the objections which have been raised to this scheme on account of want of space for sheds, railway accommodation, and future development, we believe that upon closer examination, it will be found that the site proposed allows of ample space for present requirements and future extension, both in regard to warehouse and railway accommodation. It is true that this scheme involves more dredging than would be the case under Scheme III., and that vessels would have a somewhat greater length of channel to navigate before reaching the wharves, but we are confident that the dredging and maintaining of the channel and berths will present no serious difficulty and that no appreciable disadvantage will be experienced on account of the greater length of channel to be navigated.

Drawings.

10. We have consequently prepared two drawings numbered 1 and 2 to accom-

pany this report. Drawing No. 1 is to a small scale and shows the whole area from Ebute Metta to mouth of the lagoon. The proposed wharves and railway connection are shown by a green colour, the extension of the Customs wharf and the East Mole, works already sanctioned, are shown by red colour. The sites for a coal depôt and coaling wharf to be referred to later in this report are indicated by blue colour.

11. Drawing No. 2 shows to a large scale the proposed wharves with sheds, railways, &c., and also the extension of the Customs wharf.

12. We would suggest that before any final decision be taken in the matter that these proposals be submitted for the very careful consideration of the Railway Department and the mercantile community, and if after thorough examination they are of opinion, as we believe will be the case, that the proposals provide ample quay and shed accommodation (with means for extension as required) for dealing with freight in and out of vessels, and also sufficient space for all railway requirements for goods and passengers, we would have no hesitation in recommending them for adoption.

13. A detailed description of our proposals is as follows:—

Wharves.

14. The new wharves would commence at the south-eastern extremity of the Customs wharf when enlarged as already arranged for and would extend along the Marina for a length of 1,400 feet in the first instance. It is considered that this length would give sufficient accommodation, taken in conjunction with the Customs wharf, for the berthage of all vessels likely to use the port for some years to come. We would propose to keep the deck level of the new wharves at the same level as the present Customs wharf. This we believe will be found the most convenient arrangement and will be best suited to the existing shore levels.

Reclamations.

15. The space between the wharf wall and the Marina would be filled in with suitable sand obtained from the dredgings, forming a reclamation of from 250 to 280 feet in width in front of the present sea-wall of the Marina, which would be available for sheds, railways, sidings, &c.

16. We would also propose to reclaim the area between the back of the Customs wharf and the shore thus providing further space for sidings, &c. This reclamation would be formed by tipping a bank of rubble stone to be obtained from the quarries at Aro and filling in behind with sand as described in the preceding paragraph.

17. At the south-eastern end of the proposed wharves a further reclaimed area would be formed of about 800 feet in length and about 100 feet in width for the purpose of marshalling trains prior to their being despatched up-country. These reclamations are clearly shown upon the drawings and are tinted green.

Sheds.

18. We have shown upon the plan 3 sheds, each being 350 feet long by 100 feet in width. We have carefully considered this question with the Government Officers and are satisfied that sheds of the dimensions proposed would provide ample accommodation for dealing with cargo boats inwards and outwards. It is, of course, to be understood that these sheds are not intended to be used as general warehouses, but merely as transit sheds through which all goods should be passed as rapidly as possible. A space of about 30 feet in width has been allowed between each shed. As the wharves and sheds are extended, it will be necessary at certain intervals to allow sufficient space between two sheds to enable cross-over road to be laid, connecting the railway lines in front of the sheds with those at the back. The floor of the sheds would be laid level at a height of about 9 inches above the quay coping, the quay being sloped up to that level so that rain water, &c., may drain away from the shed. At the back of the sheds, there could be a drop of 2 feet 9 inches so that the floor would there form a platform which would much facilitate the loading of trucks, &c. The general arrangements of the sheds are clearly shown on Dg. No. 2, the levels of the quay, shed floors, and railways being shown to a larger scale upon the cross sections. The sheds would be provided with sliding doors at frequent intervals.

Railway at wharves.

19. A width of 45 feet has been provided between the front of the sheds and the face of the quay. This will allow of ample space for three lines of railway. At the back of the sheds there is width for the five lines of rails shown upon the drawing with space for still further lines or sidings if desired, without encroaching upon the Marina. Cross-over roads and turn-outs would, of course, be laid as required. These are not shown upon the drawing, but would be inserted in such places as might be considered necessary. At the south-eastern end of the wharves, provision is made, as already referred to, for sidings for marshalling trains, &c. A

space is also available at the north-western end of the wharves, and behind the Customs wharf for similar sidings. The railways are clearly indicated upon Drawing No. 2 by heavy lines.

20. We have already in paragraph 18 referred to the advantage to be gained by placing the railway lines at the back of the sheds, at some distance below the floor level in order to facilitate the loading of trucks. This is usually accomplished by ramping up the floor of the shed from the front to the back, the railway being laid at practically the same level on each side of the shed. In the present instance, owing to the extremely low level of the Marina, we have considered it best to lower the level of the rails at the back of the sheds keeping the floors of the latter level. This will necessitate some adjustment of levels at either end of the row of the sheds where the railway at the back and front are connected, more particularly at the back of the Customs wharf.

Railway connection and bridge over lagoon.

21. It is essential that the new wharves if constructed should be connected with the Colonial Railway system, and in order to give effect to this, it will be necessary to carry the railway from its present terminus at Iddo Island to Lagos by means of a bridge across the lagoon. The carrying out of this work would naturally fall to the Railway Department, and the proper site for the bridge and best means of carrying it out would, no doubt, be thoroughly considered by the advisers of the Government on railway matters. We have, therefore, merely indicated upon Drawing No. 1 two alternative positions for consideration. If that shown by full green line were to be adopted, it would have the advantage of leaving Iddo wharf free for traffic as at present, whereas if the bridge were placed below the wharf as shown by dotted green line, vessels could not approach without passing the bridge by means of an opening span. This might necessitate frequent opening of the bridge which would be a source of considerable inconvenience to the working of the railway traffic. Another alternative, assuming that upon the completion of the new wharves, Iddo wharf would no longer be used, would be to utilize the latter as an approach to the bridge which would, in that event, extend from the lower extremity of the wharf to Lagos Island. By this means, the length of new bridge required would be somewhat reduced, but additional strengthening and possibly widening would be necessary at the landward end of the wharf in order to provide a convenient approach, without abrupt curves, for main-line traffic.

22. In constructing the new bridge, we gather that over a portion of its length, at any rate, there should be a clear headway above water level not less than that which now exists under the higher portion of Carter Bridge so as to enable lighters and small craft in tow of steam launches to pass under. To effect this, it would be necessary to build portions of the bridge upon an incline. In order to admit of larger craft being passed through, if desired, it would be necessary to provide the bridge with an opening span. At certain times of the tide a strong current runs through Carter Bridge and in front of Iddo wharf. It would be advisable, therefore, in the interests of navigation, and to avoid risk in the case of craft passing between the piers of the bridge that the latter should line as nearly as may be practicable, up and down stream. It would also, in our opinion, be desirable that the foundations of the bridge should be put in of sufficient width to allow of a double line, though in the first instance a single line would probably be found sufficient. In the correspondence forwarded to us, reference is made by the General Manager of Railways to the bad state of repair of Carter Bridge, and to the expense which is incurred in its maintenance, and he suggests that the new railway bridge if carried out should be so constructed as to carry vehicular traffic. In designing the bridge this point might well be considered, though it would undoubtedly add very considerably to the cost. On the other hand, it is, of course, absolutely essential that means for vehicular and pedestrian traffic across the lagoon should be maintained, and in view of the possibility of Carter Bridge requiring renewal at an early date, the adoption of the above suggestion would probably prove economical.

23. The railway upon reaching Lagos Island would be carried along the foreshore past Elegbata till it is connected with the new wharves railways upon the reclamation at the back of Customs House wharf.

24. In order that merchants having stores and warehouses in the neighbourhood of the native market below Carter Bridge might have ready means of sending their produce, &c., to the new wharves for shipment, it would be advantageous if a branch line were carried along the foreshore, at least as far as Carter Bridge. This branch line together with the line from the railway bridge to the wharves described in the last paragraph are clearly shown by heavy green lines upon drawing No. 1.

Branch line.

A considerable portion of the foreshore referred to has recently been reclaimed, but it is probable that it will be necessary to widen this reclamation to some extent in order to provide sufficient width for a double line of railway between the railway bridge and the Customs wharf.

Depth of water to be provided.

25. We understand that the mail boats now coming to the coast draw from 19 to 20 feet when loaded. It is highly probable, however, that upon the opening out of the bar, vessels of greater draft would require to use the port, and we would recommend that a depth at the wharves of, say, 26 feet at low water of ordinary spring tides, should be aimed at in the first instance. This depth would admit of vessels drawing 24 feet being brought alongside. Having regard, however, to the general tendency to increase the draft of vessels, we are of opinion that the quay walls should be so constructed as to admit of an ultimate depth of 30 feet along side being provided, should such be rendered necessary in the future.

With regard to width of channel, it will be seen from the plan that we propose, in the first instance, a channel 500 feet in width should be formed opening out to a greater width near the entrance. An additional depth of, say, 5 feet should also be provided at the mouth of the harbour to allow for the "scend" of vessels entering when any considerable swell is running. In front of the wharves we have shown a width of 800 feet which would be sufficient to allow vessels to turn. These widths and depths could, of course, be modified as circumstances required.

Equipment.

26. The equipment of the wharves with special machinery for dealing with cargo is a matter which will require consideration when the time comes. Grain elevators or other apparatus could be installed when required, but we gather that the trade in grain is not sufficient at present to justify this outlay. It is probable, however, that moveable electric cranes would be found of great convenience in dealing with ship's cargo. We have consequently provided railway lines to carry such cranes along the front of the wharf. These cranes would be arranged so as to span the outer line of railway thus enabling trucks to pass under. The usual mooring bollards and fender piles would also be provided. Arrangements would also be made for carrying water pipes along the back of the quay wall for supplying vessels with fresh water, &c., so that upon the completion of the contemplated water scheme the necessary pipes and hydrants could be laid.

Drainage.

27. Provision would, of course, be made for the drainage of the reclaimed area, and in this connection it would probably be necessary to carry an intercepting drain along the seaward side of the existing tram line in order to pick up the drains now running across the Marina. Outfall through the wharf wall would be formed at suitable intervals.

Further extensions.

28. From the information supplied to us we consider the proposals as shown upon the drawings and described in the preceding paragraphs, provide sufficient accommodation, in conjunction with the extension of the Customs wharf, for such trade as may be expected upon the opening of the bar to mail steamers, and for some years to come. Should the increase of trade require further accommodation this could be obtained by extending the quays and sheds down the Marina as noted upon Drawing No. 1.

Coal depôt.

29. In connection with this scheme we have shown a proposal, which has been discussed, and has met with general approval, for a coaling wharf and coal depôt near Wilmot Point. Upon the access of large vessels to Lagos it would undoubtedly be necessary to store a considerable supply of coal, and it would clearly be inadvisable to form such a depôt near the Marina. The neighbourhood of Wilmot Point appears to us suitable for such a depôt. It is of easy access for vessels and possesses deep water close to the shore and ample space at the back for stacking coal.

30. We would propose to construct a short wharf about 250 feet long and about 30 feet in width connected with the shore by one or two approach jetties which would be sufficient for discharging one vessel. Close in shore would be wharves for loading lighters of, say, 100 tons carrying capacity. It would be desirable to connect the coal depôt with the railway system at the new wharves on the Marina, by a single line of railway. This would necessitate the construction of a bridge to carry the line across Five Cowrie Creek. We have indicated by blue colour upon Drawing No. 1 the proposed site for the coaling depôt and wharf and line of connecting railway. The exact site for the depôt and route for the railway would be determined after more detailed information than is at present available had been obtained.

Floating dock.

31. It is probable that with the opening of the port a floating dock of large capacity would be required. A suitable site for such a dock would be in the neighbourhood of the proposed coal depôt. The most suitable dimensions for the dock

would be a matter for future consideration. In connection with the floating dock, workshops for the execution of repairs to vessels would be required. The placing of a large dock at Apapa would necessitate forming and maintaining a deep-water channel across the Marina shoal which would involve a large initial cost, and in all probability a constant expense for maintenance and we consider the site near Wilmot Point would be in every way the more suitable. The completion of the East and West moles, which is, in our opinion, essential for the success of the harbour scheme generally, would prevent the ocean swell from entering the lagoon to an extent likely to interfere with the working of a floating dock in that locality, and in the event of such a dock being placed there, it would be a question for consideration by the Government whether the workshops at Apapa should be removed to that spot.

Estimate of cost approximate only.

32. It is not possible, with the information at present available, to form an estimate of the cost of the proposed works with any accuracy, and, therefore, the figures which we give below must be regarded as approximate only, and subject to revision when further information is available, and all details have been thoroughly re-considered. With regard to the type of quay wall to be adopted we should prefer, if possible, the use of concrete in some form or other as being more permanent in tropical waters than iron, or steel, though more costly in the first instance, owing to the fact that no material suitable for concrete is available in the district, but would need to be obtained from the quarry at Aro.

33. As previously mentioned, the carrying out of the railway bridge across the lagoon would not devolve upon us, but in order that this report might be completed we had considered in a general way the probable cost of such a bridge. Assuming that good foundations were obtainable at a moderate depth, we estimated that a lattice girder bridge with 120 feet spans suitable for a single line could be constructed for about £110,000. The provision of two lines of railway and a roadway would probably double that cost. From enquiries made since we have been in Lagos and judging from some difficulties experienced in the carrying out of Carter Bridge where it appears that in some cases for more than 50 feet below the bed of the lagoon only soft material was met with, it seems certain that for some distance at any rate it will be necessary to sink to a considerable depth in order to ensure satisfactory foundation for the bridge piers. In this case, the estimate of £110,000 above mentioned would be increased. This is a matter, however, with which it is impossible to deal without accurate information, but we have included a provisional sum of £125,000.

Survey required.

34. Should it be decided to proceed with execution of the wharves as proposed, a detailed survey of the site would be necessary with such levels, sections, soundings, borings, &c., and other information as might be required for the full consideration of the question, and to enable a decision to be come to with regard to the best mode of construction to adopt.

Estimate.

35. Subject to the foregoing reservations, we estimate the cost of the works as shown upon the drawings as follows:—

Concrete quay walls with reclamation for sheds, sidings, &c., including widening for railway round Elegbata Point. Foundations of walls to be laid so as to admit of 30 feet ultimate depth alongside at low water. Actual cost of dredging channel and berths is not included	£260,000
Forming and laying railways and sidings, including branch line to Carter Bridge	19,000
Shed accommodation	48,000
Electric cranes and lighting	15,000
Provision for drainage of reclamation and Marina	10,000
	£352,000
(NOTE.—Should it be found that, owing to the low levels existing along the Marina, efficient drainage could not be provided by ordinary means, the above provisional sum might be considerably increased.)	
Provisional sum for single line railway bridge over lagoon ...	£125,000
Formation of coaling wharf and coal depôt near Wilmot Point with railway connection from new wharves, including bridge over Five Cowrie Creek	50,000
Total	£527,000

36. The sums named include 10 per cent. for contingencies but include no sum for the acquisition of property, compensation, &c., nor is any sum included for actual dredging seeing that the dredging plant and cost of working the same is provided for separately. But a sum has been included for pumping the dredgings into the reclamations.

No sum is included for special machinery for dealing with coal at the proposed coal wharf. It is probable that at first, at any rate, such machinery would not be installed.

The estimates do not provide for any reclamation between the Lagos termination of the proposed railway bridge across the lagoon and Carter Bridge. We understand that the Government are making reclamations in this direction upon which the railway siding shown would be laid.

The estimates include the provision of electric cranes, lights for sheds and quays with necessary cables, but does not include the cost of the mains and generating station and plant.

37. With regard to the site for a railway terminus to which reference is made in the correspondence submitted to us, the bringing of the railway across the lagoon to the proposed wharves, whether constructed along the Marina or below Five Cowrie Creek, appear to us to be absolutely essential for the successful working of either scheme. Railway terminus.

It would also appear equally essential that upon the railway being brought into Lagos, adequate accommodation should be provided there for a terminal passenger station. We have considered this question with the General Manager and he has expressed the opinion, subject to further consideration, that upon the area proposed to be reclaimed, and shown upon the drawings, ample space will be available for providing passenger accommodation as well as for dealing with the goods traffic. The Railway Department will no doubt give this question their full consideration and no provision for this station has been made in the estimates.

38. We consider that four years from their commencement would be sufficient for the completion of the wharfage and reclamations. This time would also amply suffice for the dredging in connection therewith.

39. In conclusion, we would like to express our thanks to those officers and gentlemen who have so kindly rendered us assistance and information in connection with the preparation of this report.

In addition to the drawings referred to in paragraph No. 10, we also forward a plan showing the alternative schemes Nos. I., II., and III., referred in paragraph No. 3. Plan No. 3.

The documents forwarded for our consideration are herewith returned.

We have, &c.,

COODE, SON, & MATTHEWS.

His Excellency
The Governor,
Lagos.

Enclosure 2 in No. 55.

MEETING AT GOVERNMENT HOUSE, 7 OCTOBER, 1908.

PRESENT:

His Excellency the Governor and the Lieutenant-Governor and
Mr. S. Ayles, representing Messrs. John Holt & Co.
Mr. E. Barth, representing Messrs. J. D. Fairley, Limited.
Mr. P. Brunger, representing Messrs. Woermann Linie.
Mr. A. Clarke, representing Messrs. Gottschalk & Co.
Mr. L. Chadwick, representing Messrs. G. B. Ollivant & Co.
Mr. A. Cowan, representing Messrs. Miller Bros., Limited.
Mr. F. Gloye, representing Messrs. Witt and Busch.
Mr. H. C. Halliday representing Messrs. John Walkden & Co.
Mr. J. E. Harrison, representing Messrs. Rylands & Sons, Limited.
Mr. James Howie, representing Bank of British West Africa.
Mr. George Lingard, representing Messrs. Pickering & Berthoud
Mr. J. C. Lucas, representing Lagos Stores, Limited.

Mr. R. Miney, representing The French Company.
Mr. F. G. Osborne, representing Messrs. Paterson, Zochonis & Co.
Mr. Charles Ungebauer, representing Messrs. Sachese & Co.
Mr. O. Wilmot, representing Bank of Nigeria, Limited.
The Commercial Intelligence Officer also attended.

NOTES OF A MEETING HELD AT GOVERNMENT HOUSE, 7 OCTOBER, 1908.

IMPROVED HARBOUR ACCOMMODATION.

1. Mr. Brunger suggests that sheds be so arranged that an ocean steamer can berth before each.

2. Mr. Gloyc and Mr. Osborne press for arrangements to permit of canoes unloading at the sheds; they specially refer to canoes bringing oil.

3. Mr. Brunger suggests that goods be moved from sheds to merchants' premises by overhead travelling cranes so as to avoid interference with traffic on the Marina.

4. All the members of the Chamber of Commerce prefer the Marina scheme, except Mr. Osborne, who votes for the Wilmot Point Scheme.

5. Certain members desired to have, if possible, a single bonded store for storage of large quantities of gin.

6. It was agreed to provide all members of the Chamber of Commerce present with photographic copies of the plans.

7. His Excellency agreed, if there were sufficiently numerous applications, to assist the merchants in the matter of getting them residential sites beyond Five Cowrie Creek, or elsewhere, provided that such sites would have to be surrendered if required by Government for railway and harbour improvement works—compensation being paid for any houses built or other expenditure thereon.

Enclosure 3 in No. 55.

NOTES OF MEETING HELD AT GOVERNMENT HOUSE, LAGOS, on the 12 October, 1908, to discuss the proposals of Messrs. Coode, Son, & Matthews as to the improvement of the Harbour.

1. The discussion opened by consideration of the feasibility of letting canoes pass through the embankment (under Scheme II.) up to the present wall to deliver oil. This was held to be impracticable.

2. Dr. Johnson and Mr. Williams doubted whether the bottom of the lagoon was sufficiently solid to stand a bridge over to Iddo. They were re-assured by Mr. Wilson on this point.

3. Ultimately all except Mr. Little agreed to the 2nd Scheme, of having the wharves on the Marina adjacent to the existing Customs Wharf, provided the General Manager of the Railway was satisfied as to the adequacy of space for railway requirements.

4. Mr. Little preferred the Wilmot Point Scheme.

5. All agreed that there should be a coal depôt at Wilmot Point.

6. Mr. Williams then questioned Mr. Wilson as to the desirability of at once ordering a floating dock much larger than the one recently purchased.

7. Mr. Wilson, referring to paragraph 31, on page 8 of the report, concurred as to the desirability of obtaining a dock of large size to deal with the dredger and capable of extension hereafter in order to deal with main-line steamers.

The meeting then broke up.

J. THORBURN.

October 12.

No. 56.

SIR W. EGERTON to COLONIAL OFFICE.

(Received 17 December, 1908.)

MY LORD, S.S. "Dakar," 16 December, 1908.

I HAVE the honour to report briefly on the progress made with the construction of the Lagos Railway Extensions to the north and south of the Niger.

2. The railway to Ibadan was opened on 4th March, 1901. Considerable discussion then took place as to the route to be followed between Ibadan and Ilorin. Flying surveys were carried out in the years 1900 and 1901 of a direct route viâ Oyo, 101 miles in length, and the eastern route viâ Oshogbo, 129 miles by the trace then adopted. My predecessor, Sir William MacGregor, favoured the eastern route as running through a much richer and more thickly populated country, and that route was decided upon. The financial position of the Colony of Lagos, however, was considered not to warrant further loan expenditure, and the construction was indefinitely delayed.

3. On my arrival in September of 1904, I pointed out that the amalgamation with the rich Protectorate of Southern Nigeria had strengthened the Administration financially, and that further large loan expenditure in railway development, and other public works of a remunerative nature, was fully justified, and, in fact, was urgently needed for the development of trade and the administration of the enormous territory of Nigeria. Sanction was received on 4th November, 1904, to commence the construction of the section from Ibadan to Oshogbo, but the approval only extended as far as Oshogbo. The surveyors arrived early in January, 1905, and a fortnight later were followed by the constructors; construction being pushed on immediately behind the survey.

4. I then urged that it was essential that this and future extensions, for economy of working, especially as the products of the country to be carried over the railway were agricultural and could not bear a heavy freight, should be constructed of a much higher standard than that hitherto adopted in West Africa. After considerable correspondence this course was approved; the maximum gradient was fixed at 1 in 80 and the sharpest curvature at 15 chains radius.

5. A 3½ per cent. loan of £2,000,000 was raised in the open market in April, 1905, the price of issue being 97. £792,000 of this was required to repay the Treasury money advanced under the "Imperial Public Works Loan Act" towards the cost of the Iddo-Ibadan section.

6. The first section to Iwo (30 miles) was opened on 23rd of October, 1906, and the further extension to Oshogbo (62 miles) on the 22nd April, 1907. The traffic over this section has been satisfactory, and, I think, there is no doubt at all that Sir William MacGregor was quite right in advocating this route as far as the interest of Southern Nigeria was concerned. The following figures summarise the results of the working of the railway in 1907:—

Total receipts	£139,747
Expenditure	74,435
Net earnings	£65,312

against £24,368 in 1906.

7. While the construction from Ibadan to Oshogbo was proceeding the sanction for the survey and construction of the further extension to Ilorin was asked for, but was not received until 8th December, 1906. Some delay was caused by the sanction not being received in time to carry on the work continuously.

8. A third section to Ikerun (78 miles from Ibadan) was opened on 1st March, 1908, and the remainder of this section to Ilorin, 123 miles from Ibadan and 246 from Lagos, on 27th August last. The Northern Nigeria boundary was crossed 10 miles beyond Ikerun, and the summit of the watershed (1,400 feet) between the sea and the Niger, at the large town of Offa (96 miles beyond Ibadan). Sir Percy Girouard, as Governor of Northern Nigeria, was invited to declare the line "open," and his presence at the opening was much appreciated by the construction staff and all who were present at the proceedings. The Emir of Ilorin and the principal native chiefs of the Ilorin Province, together with an immense concourse of minor chiefs and followers, attended. The Emir, although appearing to take the greatest interest in the railway, could not be prevailed upon by the Resident of Ilorin to take a trial trip in the train.

9. I would point out that Ilorin has been reached a year earlier than was anticipated in 1906.

10. In April last a 3½ per cent. loan of £3,000,000 was successfully floated by the Crown Agents on behalf of the Government of Southern Nigeria, the price of issue being 94. Of this amount £1,230,000 is being advanced as required to the Government of Northern Nigeria to meet the cost of the construction of the line

from Baro on the Niger to Kano. The remainder is being utilized in constructing the railway from Oshogbo through Jebba and Zungeru to the junction of the Baro-Kano line, a distance of about 285 miles; in improving the first section of the line from Lagos to Ibadan; in carrying out the necessary extensions of terminal facilities; and on the extensive works now in progress to deepen the entrance to Lagos Harbour. The loan is already quoted at a premium of 3 per cent. above its issue price.

11. Sanction for the further extension from Ilorin, through Jebba, to Zungeru and beyond to a junction with the Baro-Kano line had been given in October, 1907, so that surveys had been completed, the trace staked out as far as Jebba, and work on the section well advanced before the rails reached Ilorin; consequently, when I visited Jebba in October last I was able to travel in my saloon 20 miles beyond Ilorin, and railhead is now (28th November) at 156 miles beyond Ibadan and within 27 miles of Jebba.

12. It is anticipated that the rails will reach Jebba in January, and thus direct communication between the sea and the middle Niger will be established. The length of the line from the wharves at Iddo Island on the Lagos Lagoon to the South bank of the Niger at Jebba is 306 miles; the distance by sea from the mouth of the Niger at Forcados to Jebba being about 540.

13. The line between Ibadan and the Niger is an excellently-constructed and well-ballasted line with maximum grades of 1 in 80 and curves of 15 chains radius, and has been supplied liberally with rolling-stock. It is well equipped with permanent station buildings, sidings and merchants' sites at all the principal stations. During its construction a good road has been made from Ibadan to the large town of Oyo, 33 miles to the north, and on this a Government motor service is now running, but the traffic developed does not seem sufficient to warrant the immediate construction of a branch line to this place.

14. Immediately on the receipt of the sanction in October, 1907, to the construction of the railway to Zungeru the survey of the line from Jebba was commenced; the distance from the north bank at Jebba to Zungeru is about 123 miles, and the length between Zungeru and the Baro-Kano alignment another 40 or 50 miles, according to the point at which it is decided to effect the junction.

15. On the south of the Niger there has been little difficulty in obtaining the necessary labour. The Yoruba of the Lagos Protectorate and the adjacent Ilorin Province is an excellent workman, and no labour difficulties were met with until the thinly-populated country near Jebba was approached; but on the north of the Niger the sparse population combined with the requirements of the Baro-Kano line have rendered progress hitherto very slow The survey has, however, been nearly completed, and the earthworks are now making satisfactory progress. Rail laying on the north of the river has not yet commenced owing to the inability of the contractors for the transport of the railway material by the river route to deliver more than a little over 2,000 tons at Jebba, and this consisted entirely of bridge-work material and rails for the southern line. It is probable that it will be necessary to land all the materials at Lagos and carry them to Jebba on the railway. Although the very high freight charged to Lagos may render this slightly more expensive, the economy of obtaining regular supplies throughout the year will more than counterbalance the additional cost.

16. During the last 10 years successive surveys of the river have been carried out at Jebba and elsewhere with a view to ascertaining the cost of a bridge over the Niger. On the 31st March, 1908, sanction for the construction of a bridge from the northern bank to Jebba Island was obtained. The material for the bridge has arrived at Jebba and the preliminaries for its erection are now being carried out. The cost of this bridge is estimated at about £33,000, inclusive of the railway across the island. The submission of a definite detailed estimate of the cost of a bridge from Jebba Island to the South bank is still awaited, and if the cost approximates to the rough estimate of £54,000, sanction will be asked for the immediate construction of the missing link.

17. To provide for transit across the river until the completion of these bridges a ferry-boat has been ordered, and is due for delivery in March, 1909. It will not, however, be able to reach Jebba before August next year, and until it arrives the greatest difficulty will be experienced in transporting materials across the river.

18. The importance of the immediate construction of the link between Zungeru and the Baro line having been urged by Sir Percy Girouard, his offer to supervise

the construction of that portion of the line by the Baro-Kano Railway Construction Staff was accepted by this Administration. Surveys are being rapidly carried out, and it is hoped that this connection may be completed by the end of next year, by which time the rails being laid from Jebba northwards should also have nearly reached Zungeru.

I have, &c.,
W. EGERTON,
Governor.

No. 57.

BARO-KANO RAILWAY, NORTHERN NIGERIA.

PROGRESS REPORT FOR THE QUARTER ENDING 30TH SEPTEMBER, 1908.

(Received in Colonial Office, 24 December, 1908.)

The report covers the period from the return of His Excellency the Governor from leave in England nearly up to the completion of the high river branch boat transport at the beginning of October.

2. His Excellency landed at Baro on the 27th June and arrived at Shapa *en route* to Zungeru on the 2nd July, making further inspections at Baro on the 15th and 21st August, and the 1st to 4th September while the work of discharging branch boats was in progress.

3. The Niger in 1908, as in 1892 and 1900, rose to an exceptionally high level, and it would have been possible to bring up river and discharge a much larger tonnage than was actually done. The stacking ground for material, though prepared hurriedly, proved sufficient for all needs.

4. As stated in the last half-yearly report* every European at Baro during the rains of 1907 had more or less severe fever. As the result of clearing, sanitation, and the use of mosquito-proof shelters during the heavy rains of 1908, among the 43 Europeans employed on the railway there was practically no illness. The two cases of blackwater fever which occurred were due in one case—that of a man employed locally a few days before—to exposure previous to joining, and in the other, a platelayer from South Africa, to 12 months' work in the country after continuous low fever in South Africa. The plateau on the top of the hill where the Accounts' staff is housed is being gradually cleared, and mosquitos, though still fairly plentiful, have greatly decreased in numbers and virulence. The slope of Baro Hill is occupied by the Stores Department and foremen, and the increase in health may be attributed in no small measure to raising dwellings well above the swamp, which it is hoped to fill in with the aid of the sand dredger now under order.

NIGER TRANSPORT.

5. This work, of such vital importance to the railway, began disastrously with the wrecking of the S.S. "Bassa" on the Kuka Rock below Lokoja on the 22nd July. Out of her cargo of 785 tons of sleepers, rails, tools, &c., 200 tons were salved soon after, but, unfortunately, of the earthwork tools so urgently needed very little was recovered. Salvage operations will be continued when the river falls.

6. The discharging of vessels was placed under Captain H. O. Mance, D.S.O., R.E., who with 10 non-commissioned officers and men of the Royal Engineers left England on the 4th July, arriving at Lokoja on the 28th July, at the same time as eight foremen from South Africa. To these were added six, and later on more foremen from works on line, the organization of labour being entrusted to Mr. A. Higgins, Clerk of Works, who thoroughly understands and has the confidence of the native. Captain Mance acknowledges the assistance thus rendered by Mr. Higgins as well as by Mr. W. W. Bishop, District Engineer, Baro, who was always present where most wanted.

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* No. 52.

7. The principle has been to give each non-commissioned officer or foreman his own headmen with their own gangs to look after. The working hours have been 6 a.m. to 8.30 a.m., with an hour for rest, and 9.30 a.m. to 3 p.m. The next gang came on at 3 p.m and worked until 7 p.m., when, after an hour's interval, they worked on from 8 to 12 p.m. Thus no man had more than eight hours work a day, and it was found advisable, except in great stress, to knock off half-days Saturday and Sunday, thus giving each man one day off a week.

8. The organization allowed for discharging from three boats working double hatches; thus a minimum of 850 tons a day from three boats would mean 5,000 tons a week, so that delays during high water would not be due to defective local arrangements for labour.

9. It was found necessary at first when working two hatches, with the untrained labour then available, to employ three Europeans on each ship, one to each hold, fore and aft, and one on stacking. Thus with two shifts on three vessels a minimum of 18 Europeans was required. When the labour became more accustomed to the work it was found possible to work two or even three hatches of a ship with two foremen.

10. Much inconvenience was caused by the non-arrival of branch boats between the 4th and 12th September at a time when the organization was such that the S.S. "Iddo" was discharged in $2\frac{2}{3}$ days, at an average rate of 355 tons per working day of two shifts, or 25 tons per hour of actual work. During this period too, the low level stacking ground was flooded and the material had to be discharged at a higher level.

11. *Heavy Weights.*—The "Oshogbo," with five heavy engines, involving 15 heavy weights, the boilers weighing 12 tons 5 cwts., arrived on the 12th. The discharging was effected without difficulty and this boat was also employed to discharge a boiler and heavy cases from the "Illorin" as well as heavy cases from the "Asaba." Stern-wheelers and lighters with general cargo were discharged with some difficulty owing to the absence of conveniences, as piers and cranes. Work was occasionally interfered with at night by tornados. Arrangements for discharging during 1909 have been carefully considered in the light of the present year's experience. A low level siding to the low foreshore was pushed on and will be completed as soon as the water falls.

Local Labour.

12. The local labour recruited under Mr. A. M. Lafone, Resident-in-Charge, Baro, furnished a strong backing to the imported labour and worked extraordinarily well considering they had never heard of this kind of work before. On the 12th September 19 bullocks were distributed among the gangs as a present from His Excellency for good work done on discharging vessels.

13. From start to finish the discharging proceeded with scarcely a hitch with only one serious accident, involving the amputation of an Ejoh boy's foot.

A medical subordinate was constantly on the beach during working hours, and Dr. M. Cameron Blair, Senior Medical Officer, visited the work two or three times a day. Minor cases were treated without delay, an attention much appreciated by the labourers.

14. Considerable difficulty was experienced in some ships through having to handle 30-ft. rails out of a hold with small hatches, and this materially lengthened the time occupied in discharging.

15. The best boat for discharging cargo, the "Lokoja," left Forcados on her first trip on the 18th July, and returned to Forcados after making three trips on the 7th September, or 50 days. She was aground for six days on her second trip, besides putting in two days to tow other ships off sand-banks.

16. Thus leaving out time aground and towing, the "Lokoja" made three trips in 42 days, or 14 days for the round trips. This, however, is much better time than could usually be expected, and 17 days is a much more fair basis for calculation, allowing for delays. But allowing for similar delays at Iddo Wharf, the time compares favourably with that usually taken for the round trip—Forcados to Lagos and back, 148 miles.

17. The congestion at Burutu in June, due to despatch of material there during low Niger, has been to a great extent cleared away, and much is due to the energy of Mr. Doyle, Assistant Marine Superintendent, Burutu.

Survey.

18. Work on both preliminary survey and final location has proceeded throughout the wet season, though much delayed on account of heavy rain and flooded streams.

19. In the upper reaches of the River Bako, a ·6 gradient was found to involve heavy work, and was altered from the proposed junction at mile 105 to one per cent. compensated up to Kano and ·9 compensated down from Kano.

20. The progress has been:—

—	July.	August.	September.	Total.
Preliminary survey	M. 144–154 10 miles.	M. 154–161 7 miles.	M. 161–174 13 miles.	30 miles.
Final location	M. 114–122 8 miles.	122–129 7 miles.	129–139 10 miles.	25 miles.
Average number of engineers employed on survey.	12	10	9	10

Preliminary Survey.

21. No. 1 survey party has been in charge of Mr. C. O'C. Hayes, assistant engineer, who took over from Mr. A. S. Collard, the latter proceeding on leave on the 13th July. Mr. C. R. Renny-Tailyour left the party on the 15th July to take charge of the earthwork section. The preliminary survey is now well in the middle of the central Kaduna Valley section, and successful lines have been surveyed across the Rivers Dinia, Lugwadna, Masserah, and Kogi Sarikin Pawa, the first and the last being rivers of some magnitude. Some idea of the country surveyed may be obtained from the levels of the valleys and summits dividing them.

—	Mile.	Height above sea level.	Rise or Fall.
River Bako Crossing	98½	771	—
She Summit	130	1,375	Rise 604 ft.
River Dinia	153¼	1,283	Fall 92 ft.
Summit	155	1,365	Rise 82 ft.
River Lugwadna—			
Crossing	156	1,327	Fall 38 ft.
Summit	160	1,490	Rise 163 ft.
River Masserah—			
Crossing	161½	1,430	Fall 60 ft.
Summit	166½	1,593	Rise 163 ft.
River Kogi Sarikin—			
Pawa Crossing	174	1,377	Fall 216 ft.

The loss of height could not be avoided as the valleys become too narrow and steep to allow of a crossing higher up.

22. Practically half the line is straight, and less than one quarter of the length is on the sharpest curve allowed—8°.

23. The rivers are all crossed on rock foundations, otherwise the bridging is not heavy, and much saving will be effected by the use of pipe culverts.

24. The earthwork is heavier than before, and includes some rock cuttings.

Final Location.

25. The Nummu Valley section was re-surveyed to allow of a 1 per cent. being substituted for a ·6 gradient. From August 7th to 18th, Mr. Church's party was at work on the She-Zungeru section of the Lagos Railway Extension. The second location party was broken up, and the members distributed to other works. A good site with rock foundations was found for crossing the Esé River at mile 132, ·6 or 1½ miles from the Shê summit.

26. At this summit the site for the junction with the Lagos Railway has been laid out. The altitude of the station is 1,386 feet above mean sea level. There is

ample room for quarters and station buildings. Water can be pumped up from the Esé River with a lift of 86 feet by a pipe line 1¼ miles in length.

27. Following is the curve and grade summary:—

(*a*) Mile 0 to mile 100—

Total curvature in 100 miles	5,787°
Average curvature per mile	57·87°
Proportion of curve to total length	36 per cent.
Total rise and fall in 100 miles	1,767 feet.
Average rise and fall per mile	17·67 feet.

(*b*) Mile 100 to mile 135—

Total curvature	4,944°
Total length of curvature	827·72 chains.
Average curvature per mile	141·25°
Average length of curvature per mile	23·65 chains.
Percentage of curvature to total length	44·75 per cent.
Total rise and fall	1,018·50 feet.
Average rise and fall per mile	29·10 feet.

Earthwork.

28. The progress has been:—

July, 8¼ miles at £244 per mile.
August, 7 miles at £310 per mile.
September, 3 miles at £682 per mile.

29. The work in the upper Bako and Nummu Valley section is heavy, and it will probably be necessary to look for an easier line beyond mile 105. The number of men at work, according to figures supplied by Mr. H. S. Goldsmith, Acting Resident, Niger Provinces, were,

In July, 2,637 Nupes, 859 Gwaris.
August, 3,649 Nupes, 859 Gwaris.
September, 1,457 Nupes, 2,403 Gwaris.

30. The Yoruba gangs left the earthwork section on the 12th August. Eighty-seven per cent. of the earthwork is completed on the first hundred miles. During the quarter 284,660 cubic yards of earthwork were completed. The cost per cubic yard since date of commencement works out at 4·66 pence.

31. The local labour organised by the political staff of the Nupe Provinces has worked well and cheerfully.

Bridges.

32. Cylinder foundation work was pushed on though much hampered by continuous floods, and this, as well as the steel superstructure of Nos. 1 and 2 bridges is now well in hand throughout the first 25 miles. The deviation at the Bakogi Bridge, mile 28, involving very heavy earthwork, is complete, except the temporary bridge.

33. A second bridging district was formed early in August, under Mr. A. J. Smith, with one assistant engineer, one foreman, one axeman, and about 150 Nupe labourers and 60 native carpenters. About the middle of the month another camp was formed with one assistant engineer, one foreman, and about 130 labourers.

34. Deviations with temporary crib bridges have been completed to mile 36 at site of all large bridges leaving the openings clear for foundation and steel trestle work. The deviations have been set out with 2 per cent. down and 1·33 per cent. up grades (with the construction loads) and 7° curves.

35. To obviate the expense of erecting temporary work for the smaller openings, the corrugated iron piping for 2, 3, and 4 feet culverts was transported by river from Baro to Lokun and deposited on site between miles 28 and 36. Sufficient stone was carried from a quarry two miles from the line for the relieving internal walls.

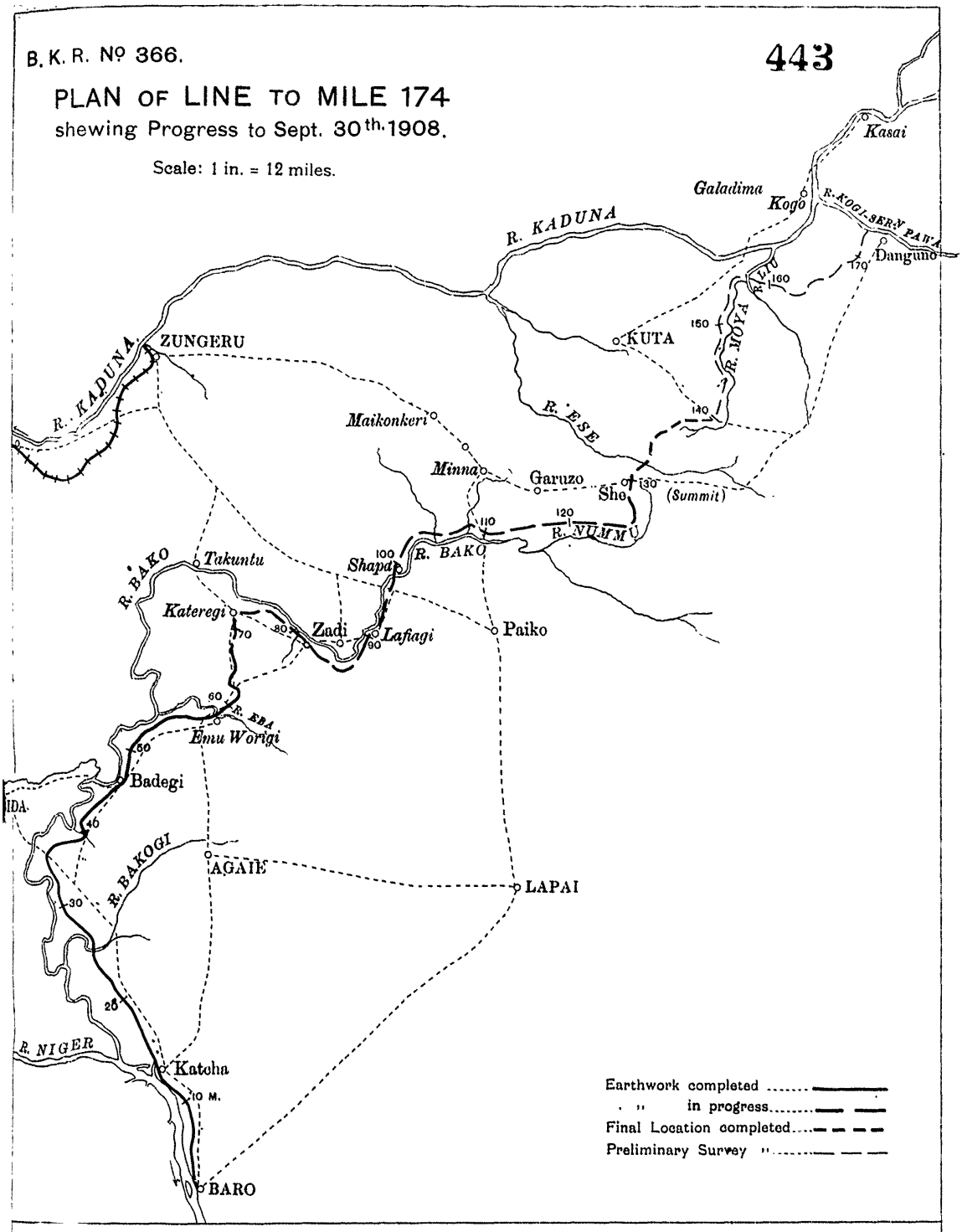
36. A quarry was opened at Takunti, on the Bako River, about 20 miles from the Eba-Bako confluence with 50 canoes for transporting the stone to points along the river bank adjoining the line.

B. K. R. Nº 366.

PLAN OF LINE TO MILE 174

shewing Progress to Sept. 30th. 1908.

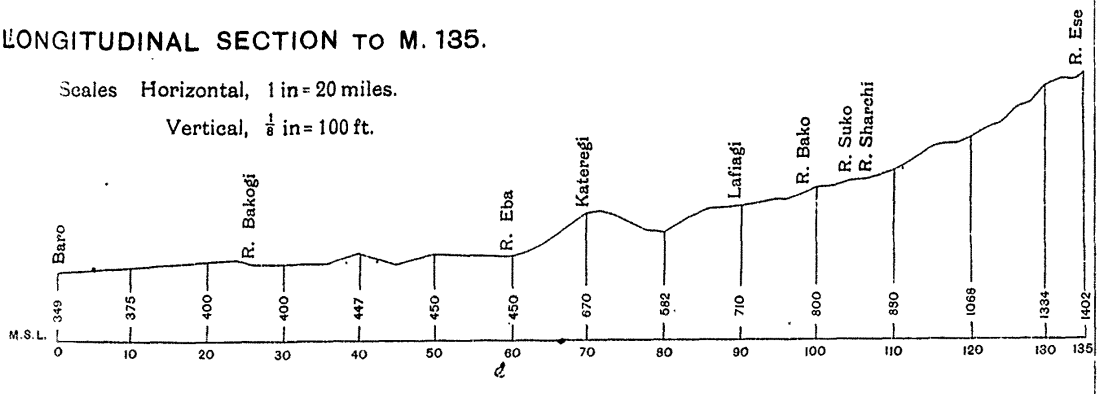
Scale: 1 in. = 12 miles.



LONGITUDINAL SECTION TO M. 135.

Scales Horizontal, 1 in = 20 miles.

Vertical, $\frac{1}{8}$ in = 100 ft.



Ordnance Survey, Southampton

Bako River Transport.

37. The channels of the Bako and Eba Rivers were cleared by the riverain tribes under the direction of Mr. H. S. Goldsmith, the Resident, up to the Eba crossing, and the Bakogi River from the confluence to the bridge site. 161 tons of cement and tools were conveyed in August and 263 tons in September by canoes, under Lieutenant Cripps, R.N.R., Assistant Marine Superintendent, at a cost of less than 6d. per ton mile for native, and less than 3d. per ton mile for steel poling canoes. This means of transport has proved invaluable for distribution of cement and tools from Baro, and stone to depôts from the Takunti quarry.

Baro.

38. Work on buildings temporarily suspended on account of supervision and labour being employed in discharging boats is now well in hand. Permanent quarters have been erected for the Chief Construction Accountant and Storekeeper and their staff, as well as for the Workshop Superintendent. Barracks have been erected for the foremen and non-commissioned officers, Royal Engineers. A large European hospital is in progress.

39. Earthwork has made good progress, though the filling of the swamp must await the advent of the sand dredger.

40. Three iron stores are practically completed, and the foundations and columns of the locomotive-shed and workshops are in hand.

Platelaying.

41. Nothing further has been done except to continue laying points and crossings in Baro Yard and a low-level siding to the beach. It is hoped to make a good start with maintenance and platelaying in November.

Rolling Stock.

42. Two tank shunting engines, Class I., W.A.G.R., and 34 bogie trucks have been erected. The erection of an eight-wheel-coupled engine, Class 103, W.A.G.R., was begun by Corporal Gatford, R.E. A fixed gantry for the erection of heavy engines was built and equipped with 10-ton differential tackle.

Sleepers.

43. The local manufacture of wooden sleepers continues. These are being used for crib bridges, and will be employed on the road on high banks. So far 6,077 have been purchased at a cost of £497 17s. 0d. The quality and shape continue to improve.

Staff.

44. Mr. O. H. Ellis, Chief Construction Accountant, arrived at Lokoja from South Africa on the 28th July, and Mr. R. K. Johnson, Acting Chief Construction Storekeeper, arrived from England to relieve Lieutenant D. Lees on the 23rd July.

45. So far the number of officers and subordinates engaged by the Baro Kano Railway from South Africa has been:—

Engineers	6
Accountants	3
Storekeeper	1
Foremen	14

46. As stated above (paragraph 6) Captain H. O. Mance and ten non-commissioned officers and men of the Royal Engineers left England in July, 1908, arriving at Lokoja on the 28th July. One non-commissioned officer was invalided with appendicitis.

Health.

47. The health of the office and construction staff throughout has been remarkably good, even the two cases of blackwater fever referred to in paragraph 4 having proved mild.

48. Deaths of horses from tsetse continue to be reported, nearly every officer having lost one or more horses during the last wet season.

49. The survey parties, who have had to work constantly in the rain and long grass, and to cross daily rivers in flood, suffered towards the end of the wet season to some extent from veldt sores, but the general freedom of these officers from illness

indicates sufficiently the advantage resulting from an ascent out of the low river valley to a height of nearly 1,400 feet above sea level.

JNO. EAGLESOME,
Director of Railways,
Northern Nigeria.

Baro,
14th November, 1908.

No. 58.

THE GOVERNOR OF NORTHERN NIGERIA to THE SECRETARY OF STATE.

(Received 7 January, 1909.)

MY LORD, Government House, Zungeru, 9th December, 1908.

I HAVE the honour to transmit herewith a copy of a telegraphic report by the Director of Railways on the progress of the Baro-Kano Railway up to the 30th ultimo, together with a brief report on the progress of the Zungeru Link prepared by the Deputy Director of Public Works, in whose charge the work is.

I have, &c.,
M. H. D. BERESFORD,
For Governor.

Enclosure 1 in No. 58.

Telegram from EAGLESOME, Baro, to SECRETARY, Zungeru, 2nd December, 1908.

2649 T. Your 4154. Brief report on progress Baro-Kano Railway to end of November, 1908, as follows:—Material landed at Baro about thirty thousand tons. Reconnaissance survey completed Baro to Kano. Paper location completed Baro to mile one hundred and seventy-four. Final location completed to mile one hundred and thirty-nine. Earthworks ninety per cent. completion in first hundred miles earthwork in progress up to mile one hundred and thirty-four. Permanent bridges completed to mile thirty-eight. Sixteen miles of track laid from Baro yard. Four engines and forty trucks erected. Headquarters buildings nearly completed. Store sheds erected. Erection of workshops, engines, sheds, sawmills and other machinery in progress.

Enclosure 2 in No. 58.

REPORT ON ZUNGERU LINK RAILWAY.

The reconnaissance and paper location surveys are completed to the proposed junction site, and the line is staked out from the Kaduna to mile 19¾. Earthworks were started on 6th October with a small gang of men, at chain 45, and are completed to chain 80 including station yard. Two parties of local labourers are employed on earthworks at mile 4½, and mile 7, and were started on 8th November and 3rd December respectively. The progress made to date is satisfactory, having regard to the fact that these people are not accustomed to the use of earthwork tools. The number of cubic yards of earthwork completed is 8,700.

The station building at Zungeru, including platform wall and all filling in, is nearing completion.

Three permanent culverts and No. 2 bridge (at mile 3½) of seven spans are finished.

All transport of materials is done by carts, the weight of materials carried to end of November, a distance of from one to three miles, being 216 tons.

A. C. RIDSDALE,
Deputy Director of Public Works.

No. 59.

THE GOVERNOR OF NORTHERN NIGERIA to THE SECRETARY OF STATE.

(Received 1.40 p.m., 19 February, 1909.)

TELEGRAM.

February 17. Rails reached mile 50.—GIROUARD.
