

Marine (1897) Department.

30/5/89

G.O., No. 759 in an

DATED 27. august 1897

[Despatch Abstract.]

Jetties at Locau a da. P.W. Pros. observing that the S.R.'s report of April last on the work done to the — is satisfactory and encouraging, and approving with remarks that Officer's proposal to stop the extension of the jetties for the present, Comtd to the P.P. Officer.

2/6/97

4/9/97

Paper taken out of the Records.

BUILDINGS AND ROADS.
CIVIL WORKS.

PUBLIC WORKS. *Current Number 116*

Regd.

Spare copies

G.O., No. 2221 W., 14th August 1897.

B
 759 mar. 27 August
 Communicated
 to the Presidency for
 AUGUST. officer.

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per
3/17/17

Observing that the Superintending Engineer's report of April last on the work done to the — is satisfactory and encouraging, and approving with remarks that officer's proposal to stop the extension of the jetties for the present.

Telegram from the Superintending Engineer, I Circle, dated Dowlaishweram 8th December 1896.

From J. C. LARMINIE, Esq., M.I.C.E., Superintending Engineer, I Circle, to the Chief Engineer, Public Works Department, dated Gopalpur, 8th January 1897, No. C./5.

In reply to your memo. No. 2 C. of the 2nd instant, I have the honour to state that I do not see how I can offer a more definite opinion regarding the clearance of a channel through the sand bar at the mouth of the Cocanada river than that already given throughout the correspondence on the subject; paragraph 4 of my letter, No. 1955 G.D., dated 17th December 1896, specifies the various references on the subject, winding up with my letter, No. C./247 of 21st October 1896, submitting the jetty estimates for sanction.

2. That the necessity for the provision of a sand pump dredger had, up to date of your memo. No. 4552 C. of 2nd December 1896, been contemplated and as I understood, tacitly admitted, appears from the following references on the subject.— paragraph 18 of your note printed with G.O., No. 2445 of 24th August 1896; clause 4, paragraph 19 of the same note, resulting in the orders passed in G.O., No. 2805 of 30th September 1896, directing me to submit an indent for a sand pump dredger and your subsequent telegram of 24th October 1896 to hasten despatch of the same.

3. From these, I inferred that all difficulties were now at an end and looked on the future efficiency of the port as quite an assured fact, while in Cocanada the apparently near realization of so long felt a want was regarded quite as a matter for congratulation.

4. With reference to paragraph 2 of your memo. under reply, I would invite a re-perusal of paragraphs 8, 9 and 10 of my report, printed with G.O., No. 2445 W. of 24th August 1896. From these three paragraphs alone it would appear that (in the opinion of the writer) a dredger was an integral part of the scheme.

5. Your own opinion of the "Wenlock" is stated in paragraph 18 of your note printed with the same Government Order.

6. With reference to your paragraph 4, I would observe that there will be ample time before the completion of the jetties, in which to procure the dredger. Stone is being deposited as quickly as possible, but it will take some time yet to complete the total supply even at the rate of 3,000 cubic yards per month (estimated quantity 28,000 cubic yards) and time must be allowed for it to settle before any attempt is made to build or section it.

7. So soon as stone has been deposited all along the line of the wall to above half tide level, I then intend making an attempt to clear the highest part of the shoal by manual labour.

8. Could a channel giving a depth of six feet at even half tide be opened out, I believe the merchants would offer no great objection to the closing of gap A in the south jetty. Until this is done, no particular result can be expected from the work, and it was with this object in view, that all along, I have so strenuously advocated the provision of suitable dredging plant.

From J. C. LARMINIE, Esq., M.I.C.E., Superintending Engineer, I Circle, to the Chief Engineer, Public Works Department, dated Cocanada, 15th February 1897, No. C./66.

In reference to G.O., No. 3187 W. of 7th November 1896, directing me to report on a note by Mr. J. R. Bell regarding the possibility of preventing further ingress of Gó dávari silt into Cocanada Bay, I have the honour to submit the following observations, having delayed doing so, until other engagements permitted of my making an inspection of the river outlets in question.

GOVERNMENT OF MADRAS.
PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

READ—the following papers:—

Memorandum from the Chief Engineer, Public Works Department, to the Superintending Engineer, I Circle, dated 2nd December 1896, No. 1552 C.

On the strength of urgent petitions from persons in Cocanada stating that the port was likely to become closed up altogether unless something was at once done to improve its condition, a scheme for extending the groynes was prepared and sanctioned by Government. The Presidency Port Officer has lately visited Cocanada and has now represented to Government that the proposed works are unnecessary, and that things can quite well be left as they are till such time as the port can be removed to Vakalapudi. I therefore have the honour to request that you will, as early as possible, give me information on the following points:—

First.—In your opinion can the port be left as it is without fear of the passage out to sea becoming entirely blocked within the next three years. It seems to be possible that the floods in the Gó dávari may have kept the passage opened and so temporarily removed all cause of anxiety, but that there will be the same state of affairs again as existed at the time the petitions were written.

I have asked the Port Officer for his opinion on this point, and yours must be given independent of his.

Second.—It is stated that it will be quite impossible to clear the sand bank between the two proposed groynes without using a sand pump dredger costing £12,000 or about 2 lakhs of rupees. Are you of this opinion? As far as I can judge there seems to be no reason why the bank should not be cleared by hand assisted by the dredger now belonging to the port. When the groyne has been constructed at each side of the channel, I do not see why it should be more difficult to clear the sand to 3 feet below L.W. in this case than it was in the case of the excavation of the Buckingham canal and many other canals that run into tidal water, or it would be in the case of excavating a canal to Vakalapudi which now seems to be the idea of the Presidency Port Officer. I further do not think that a sand pump dredger would be suitable for working in such shallow water.

If the sand bank cannot be cleared without two lakhs having to be spent on a dredger, the scheme for extending the groynes must fall to the ground.

Third.—What is the average time an ordinary sized cargo boat takes to make a trip to a steamer and back by the present circuitous route, and what would be the average time if the channel were made by groynes as proposed, and what are the daily working expenses of such a boat. Supposing a boat carrying 20 tons and costing Rs. 5 a day to work only makes one trip by the present route while it would be able to make two by the proposed one it is evident that in the latter case 40 tons would be carried for the same cost as 20 in the former.

Fourth.—At what stage has the groyne work lately sanctioned arrived and how long will it take to complete. I will be much obliged if you will give me a very early answer to these questions, and I think it will be well if you consult several of the merchants interested as their opinions may not be the same as that of the Port Officer.

2. Even were such a scheme practicable, at a moderate expenditure, it would be quite unnecessary, for, it has apparently escaped Mr. Bell's notice, that all the trouble at Cocanada is due, not to the advance of Gódávári mud from the south, but to the travel of sand along the beach from the north due to the strong littoral current.

3. The view expressed in paragraph 10 of Mr. Bell's note is quite contrary to observed facts. With the extension of the northern jetty, the coast line for some little distance to the north of it, has advanced owing to the accretion of sand deposited by the aforesaid littoral current. This advance has continued until it has, as described by Mr. Bell in his 10th paragraph "enfolded the mouth of the canalized river"; but with this difference, that instead of being caused by mud from the south, all the damage has been caused by the travel of sand from the north!

4. Under these circumstances it seems almost superfluous to discuss the question of the exclusion of silt any further. But as the formation of Gódávári Point, and the extensive deltaic tracts around Hope Island, are entirely due to silt deposited by the Gódávári in the course of the last fifty-five years (they were in embryo in 1842, when the survey for the Atlas sheets was made) a few remarks in this connection may not be out of place.

5. As far as I can judge from observation and the available marine surveys, the deposit of Gódávári silt has now reached its extreme northly limit and a change has * set in.

* In fact, has been in progress for some years.

6. I would here invite a re-perusal of paragraphs 17, 18, 19 and 20 of my report printed with G.O., No. 2445 W. of 24th August 1896. Paragraphs 19 and 20 read as follows:—

The charts show that as Point Gódávári extended northwards, so the bay to the west and south-west of it scours out. From 1875 to 1882, the change is marked, from 1882 to 1891, there is further improvement and particularly in the direction which affects the mouth of the Cocanada river, i.e., the advance towards it of the one fathom contour.

Paragraph 20.—In 1875, the nearest point of this contour was fully two miles from the river mouth. In 1891 the distance had decreased to something over a mile. The southern part of the bay, which in 1875 exposed extensive mud flats at low tide, is now a sheet of water of from 1 to 2 feet in depth.

In paragraph 23 of the above-mentioned report the trifling advance of Point Gódávári between the years 1882 to 1891 is alluded to.

7. All these considerations indicate, in my opinion, the inexpediency of undertaking a costly work to prevent what nature herself is now striving for and has already in a great measure attained.

8. The whole tendency of the Gódávári during recent years has been to reserve its former action, the principal opening being now to the south (instead of as formerly to the north into Cocanada Bay) through the channels marked A on the accompanying tracing from the Marine Survey of 1891.

9. A comparison of this with the old Atlas sheets of 1842 will show how the southern branches marked B, C, D have opened out, thereby causing the growth of the Sacramento shoal.

10. This opening out is no doubt due to the shoaling up of the northern branches at their entrance into Cocanada Bay and consequent inability to afford a free discharge to flood water and this change of régime, in itself, reduces to a minimum, the amount of silt now brought into the bay, a quantity which, in recent years, has done no appreciable harm.

11. It seems unnecessary to discuss the difficulty and expense which would be involved in the construction of an embankment like that advocated by Mr. Bell across the low-lying mud flats and a wide and deep (where the bank would cross) branch of the river. Considerable inconvenience to trade would also be caused by the closure of the Coringa river, in which the French Settlement of Yanam has vested interests.

From J. C. LARMINIE, Esq., M.I.C.E., Superintending Engineer, I Circle, to the Port Officer, Cocanada, dated 25th February 1897, No. C./54.

I have the honour to inform you that on this day I intend to begin closing the gap in the south jetty wall, through which cargo boats, &c., now pass out from Cocanada river into the bay.

2. I am aware that this procedure is somewhat opposed both to your own and the opinions of some of the merchants on the subject. But, responsible as I am for the success of a scheme on which Government have expended so much money, I can defer the closure no longer.

3. Until this gap is closed no material result can be expected from the extension of the southern jetty.

4. As you are well aware, the channel from the gap into the bay is threatened by the advance southwards of the sand shoal, so that the necessity for the provision of another exit becomes daily of greater urgency.

5. There is no other alternative but the passage across the bar, and any further delay will only accentuate the difficulty and expense of clearing it (the bar).

6. I do not anticipate that the closing of the gap will cause any very serious inconvenience to shipping operations. Even now boats have often to wait for a rise of tide before coming into the river through the gap. When it is closed, and for some little time after, at all events, arrangements must be made not to despatch boats over the bar within a certain period, before low water and after the turn of the tide. This period, probably, will be four hours before low water and two hours after turn of the tide, for boats drawing $4\frac{1}{2}$ feet of water.

7. Under these circumstances, I have the honour to request you to be good enough to intimate to the boat owners generally the closure of the gap with any other instructions to them you may consider necessary. For some little time after closure of the gaps, the loading of the boats should be done with judgment.

No. C./55.

Copy forwarded to the Chief Engineer, Public Works Department, for information.

25th February 1897.

(Signed) J. C. LARMINIE,
Supg. Engineer, I Circle.

From J. C. LARMINIE, Esq., M.I.C.E., Superintending Engineer, I Circle, to the Port Officer, Cocanada, dated Camp Cocanada, 25th February 1897, No. C./77.

I have the honour to state in reply to your letter, No. 1591 of to-day, that to give up the intention of closing the gap means, to all intents and purposes, the abandonment of a scheme in which so much money has been expended. The question is purely an engineering one for which I am responsible. I must again repeat that, until the gap is closed, no real progress can be made on the bar and if we are to wait until a perfect channel, navigable at all states of the tide, is ready before the closure of the gap is started, it means postponing indefinitely the improvement of the port. If the gap cannot now be closed, dredging must cease as it is a waste of money trying it any further. As, however, the channel over the bar is not buoyed out, I shall postpone further action, until next Wednesday, to enable you to do so.

No. 2221 W., 14TH AUGUST 1897.

No. C./78.

Copy forwarded to the Chief Engineer, Public Works Department, for information in continuation of this office No. C./55 of to-day, together with a copy of letter No. 1591* of the same date, to which it is a reply.

* From the Port Officer, Cocanada.

(Signed) J. C. LARMINIE,
Supg. Engineer, I Circle.

25th February 1897.

ENCLOSURE.

From G. W. WICKS, Esq., Port Officer, Cocanada, to the Superintending Engineer, I Circle, dated 25th February 1897, No. 1591.

In reply to your letter, No. C./54 of this date, and just received by me, I have the honour to request that you will suspend the work of closing the gap until your letter can be placed before a meeting of the Board which I will call as soon as possible.

2. This matter, I consider, is of such vital interest to the trade of the port that I hope you will take no immediate action to carry out your intention of closing the gap and that you will kindly stop the boats throwing in stone in the gap for the present.

From J. C. LARMINIE, Esq., M.I.C.E., Superintending Engineer, I Circle, to the Chief Engineer, Public Works Department, dated Waltair, 8th April 1897, No. 79 G.D.

With reference to your memo., No. 994 C. of 18th February 1897, I now have the honour to submit a tracing from the survey showing the exit from the Cocanada river, with the soundings and the condition of the shoal for the six months (October 1896 to March 1897), and to report as follows.

2. By the end of January, the southern jetty had been raised above high tide level, along its whole length, to the end of the 400 feet curve; the curved extension to the north jetty had also been formed, up to low tide level.

3. During February attempts were made by means of the two old bucket river dredgers from Dowlaishweram, to open a passage through the bar, which at that time consisted of a ridge of sand about 150 feet wide, situated about half way between the ends of the jetties and the red and black buoys now marked on the tracing.

4. The weather was fresh and breezy nearly every afternoon, when a choppy sea got up, and without a proper steam tug the work was carried on under considerable difficulties. All that the bucket dredgers could do was to clear out two narrow parallel channels (the dredgers worked alongside each other). At very low tides also some excavation by manual labour was carried on.

5. Meantime, since the extension of the jetties, it had become apparent that powerful tidal currents were at work to and fro across the river mouth, to facilitate and induce some portion of these to enter between the jetties, the southern jetty was extended another 100 feet beyond the termination of the curve. This had some slight effect and served to indicate what might be expected were the gap in the southern jetty closed, for through this still, the main body of the tidal flow found its ingress and egress to and from the river.

6. The dredging on the bar merely served to show what might be attained by proper appliances, and the weather having become still more unfavourable, they were sent back to Dowlaishweram, and I then determined that at all hazards the gap should be closed.

7. Several members of the Port Conservancy Board were strongly opposed to this course, being unwilling to risk a stoppage of communication with the shipping for even a brief period. However, at a meeting of the Board held on the 27th February, it was decided after some discussion that the gap might be closed as a tentative measure with bags of sand (see this office endorsement on the Proceedings, No. 2545 G.D., dated 4th March 1897).

No. 2221 W., 14TH AUGUST 1897.

8. In a subsequent meeting on 18th March 1897 when neither the President nor myself were present, it was resolved that on the slightest appearance of difficulty or delay to boats in getting over the bar, the gap should be again re-opened (presumably by the Board itself)!

9. Between the 16th and 20th March the gap was closed and since then there has been a steady improvement. As was anticipated, the powerful tidal current which hitherto passed in and out of the gap now scours up and down between the jetties, one result being the diminution of the sand accretion which had formed along the north jetty, opposite the gap, while the increased depth in the channel across the bar, between the buoys, points to its effect in this direction. Furthermore, the width of the bar has considerably decreased, not being now more than 50 or 60 feet wide, where the minimum depth at low tide as shown by the row of black figures on the tracing is $2\frac{1}{4}$ feet (actual soundings at low water give a little more).

10. Altogether, the results of closing the gap are most encouraging and as I had all along hoped for. The improved state of affairs is even admitted by the Port officer.

11. The sand bag dam across the gap may collapse at any moment; it is sinking daily as sand escapes through decay of the bags; so, keeping in view all the foregoing conditions, I have given orders to proceed at once with the filling in of stone over the bags with a view to permanently closing the gap. The old circuitous channel from the gap is deteriorating; so, under all the circumstances of the case, I think it would be folly to re-open it.

12. At the same time, it must be admitted that, occasionally, there may arise difficulties in the navigation over the bar. A strong cross current, from the north, sweeps across the opening between the jetties with the flood tide, while the reverse takes place on the ebb. With the wind fresh anywhere between north-east and south-east, a lumpy sea gets up, which, combined with the strong current, renders the passage difficult, considerably enhanced by the narrowness of the channel.

13. It has been suggested that, in accordance with the sanctioned estimate, the jetties should now be extended outwards so as to get out beyond the bar, which could then be easily dredged out. But I am quite satisfied that their present termination is as favourable as can be arranged and is particularly so in respect to the direction and set of the tidal currents on the bar. Were the jetties extended, this effect would be interfered with, while the formation of a new bar further out would inevitably result.

14. The balance of the estimate (Rs. 44,200) is provided in this year's budget. But if the foregoing view be accepted only a small sum will be required. Another point for decision is whether the jetty should be left in its present rough unsectioned condition. The estimate provides for building it to a uniform section, and the cost of doing so will be 24,527 cubic yards at annas 4 = Rs. 6,132.

15. In conclusion, I would again point out, that to maintain a really safe and satisfactory channel through the bar, a sand pump dredger is essential. The coast line north of the jetties is slowly advancing eastward—a condition most likely to tend to the eventual growth of the bar, outside the present position of the buoys and further removed from the scour of the ebb tides.

From J. C. LARMINIE, Esq., M.I.C.E., Superintending Engineer, I Circle, to the Chief Engineer, Public Works Department, dated Camp Dowlaishweram, 27th June 1897, No. C./202.

I have the honour to invite your consideration of my report, No. 79 G.D., dated 8th April 1897, on the Cocanada river jetties, and to request orders on the question of building the wall to sanctioned section.

* See paragraph 14 of above letter.

The gap is now permanently closed with stone and all traffic passed to and from over the bar.

INSPECTION Notes of J. C. LARMINIE, Esq., M.I.C.E., Superintending Engineer,
I Circle, on Cocanada river jetties, dated 20th July 1897, No. C./310.

The whole of the southern extension has settled down, so that at full tide it will be nearly a foot under water.

The contractor should be instructed to at once bring down an additional 1,300 cubic yards of stone, when the work should be raised three to a width of six feet. Across the gap which has been faced with rough stone is a hollow in the middle over the sand bag core. This hollow has first to be filled in using all the small stone available, so as to close all the interstices through which the tide now flows to and fro. When the gap has thus been brought up to the general level of the rest of the work, the extra three feet of raising can then be carried out so as to bring the whole length of the wall to one uniform level. The work can be put in hand so soon as punts can be made available, the contractor doing the work.

The question of building the jetty to sanctioned section (6 feet top width, slopes $1\frac{1}{2}:1$) was referred to the Chief Engineer last April. It will not, however, be advisable to do anything in this direction until all settlement has ceased.

The condition of the bar has much improved, the width having decreased, so that it cannot now be more than 30 feet wide, if so much. This is due, no doubt, to the strong tidal currents to and fro across the river mouth, while the tidal current up and down between the jetties has deepened the channel and maintained and improved the channel out between the buoys. As has been reported to the Chief Engineer in this office No. 79 G.D., dated 8th April 1897, on no account should the jetties be ever extended beyond their present position, as to do so would interfere with and alter the tidal sweep across the mouth of the river.

ORDER—No. 2221 W., dated 14th August 1897.

His Excellency the Governor in Council observes that the Superintending Engineer's report of April last on the work done to the jetties at Cocanada is satisfactory and encouraging.

2. The Superintending Engineer's proposal to stop the extension of the jetties for the present is approved. They should, however, be neatly sectioned, the sectioning to the southern jetty being done when all settlement has ceased, as recommended in the Superintending Engineer's Inspection report of the 20th July 1897.

3. The proposal of the Gódvári District Ports Conservancy Board to purchase a dredger, is under consideration in the Marine Department.

(True Extract.)

J. C. Larminie
Under Secretary to Government.

To the Superintending Engineer, I Circle.
" Examiner, Public Works Accounts.
" Revenue Department.
" Marine Department.
" Financial Department.

Exd. T. K. Narayana Aiyangar.

Marine Department.

BUILDINGS AND ROADS.
CIVIL WORKS.

Government {1897} of Madras. PUBLIC WORKS.

Recd.

Enclosures

Regd.

1897.

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G.O., No. 2221 W., 14th August 1897.

No. 759 dated 27-8-97

Communicated to the Pres.

Post officer.

AUGUST.

1897

To

The P. P. O.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

READ—the following papers:—

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First.—In your opinion can the port be left as it is without fear of the passage out to sea becoming entirely blocked within the next three years. It seems to be possible that the floods in the Gódávāri may have kept the passage opened and so temporarily removed all cause of anxiety, but that there will be the same state of affairs again as existed at the time the petitions were written.

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* In fact, has been in progress for some years.

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The charts show that as Point Gódávári extended northwards, so the bay to the west and south-west of it scours out. From 1875 to 1882, the change is marked, from 1882 to 1891, there is further improvement and particularly in the direction which affects the mouth of the Cocanada river, i.e., the advance towards it of the one fathom contour.

Paragraph 20.—In 1875, the nearest point of this contour was fully two miles from the river mouth. In 1891 the distance had decreased to something over a mile. The southern part of the bay, which in 1875 exposed extensive mud flats at low tide, is now a sheet of water of from 1 to 2 feet in depth.

In paragraph 23 of the above-mentioned report the trifling advance of Point Gódávári between the years 1882 to 1891 is alluded to.

7. All these considerations indicate, in my opinion, the inexpediency of undertaking a costly work to prevent what nature herself is now striving for and has already in a great measure attained.

8. The whole tendency of the Gódávári during recent years has been to reserve its former action, the principal opening being now to the south (instead of as formerly to the north into Cocanada Bay) through the channels marked A on the accompanying tracing from the Marine Survey of 1891.

9. A comparison of this with the old Atlas sheets of 1842 will show how the southern branches marked B, C, D have opened out, thereby causing the growth of the Sacramento shoal.

10. This opening out is no doubt due to the shoaling up of the northern branches at their entrance into Cocanada Bay and consequent inability to afford a free discharge to flood water and this change of régime, in itself, reduces to a minimum, the amount of silt now brought into the bay, a quantity which, in recent years, has done no

the difficulty and expense which would be that stated by Mr. Bell.

From J. C. LARMINIE, Esq., M.I.C.E., Superintending Engineer, I Circle, to the Port Officer, Cocanada, dated 25th February 1897, No. C./54.

I have the honour to inform you that on this day I intend to begin closing the gap in the south jetty wall, through which cargo boats, &c., now pass out from Cocanada river into the bay.

2. I am aware that this procedure is somewhat opposed both to your own and the opinions of some of the merchants on the subject. But, responsible as I am for the success of a scheme on which Government have expended so much money, I can defer the closure no longer.

3. Until this gap is closed no material result can be expected from the extension of the southern jetty.

4. As you are well aware, the channel from the gap into the bay is threatened by the advance southwards of the sand shoal, so that the necessity for the provision of another exit becomes daily of greater urgency.

5. There is no other alternative but the passage across the bar, and any further delay will only accentuate the difficulty and expense of clearing it (the bar).

6. I do not anticipate that the closing of the gap will cause any very serious inconvenience to shipping operations. Even now boats have often to wait for a rise of tide before coming into the river through the gap. When it is closed, and for some little time after, at all events, arrangements must be made not to despatch boats over the bar within a certain period, before low water and after the turn of the tide. This period, probably, will be four hours before low water and two hours after turn of the tide, for boats drawing $4\frac{1}{2}$ feet of water.

7. Under these circumstances, I have the honour to request you to be good enough to intimate to the boat owners generally the closure of the gap with any other instructions to them you may consider necessary. For some little time after closure of the gaps, the loading of the boats should be done with judgment.

No. C./55.

Copy forwarded to the Chief Engineer, Public Works Department, for information.

25th February 1897.

(Signed) J. C. LARMINIE,
Supg. Engineer, I Circle.

From J. C. LARMINIE, Esq., M.I.C.E., Superintending Engineer, I Circle, to the Port Officer, Cocanada, dated Camp Cocanada, 25th February 1897, No. C./77.

I have the honour to state in reply to your letter, No. 1591 of 'to-day, that to give up the intention of closing the gap means, to all intents and purposes, the abandonment of a scheme in which so much money has been expended purely an engineering one for which I am responsible.

No. C./78.

Copy forwarded to the Chief Engineer, Public Works Department, for information in continuation of this office No. C./55 of to-day, together with a copy of letter No. 1591* of the same date, to which it is a reply.

* From the Port Officer, Cocanada.

25th February 1897.

(Signed) J. C. LARMINIE,
Supg. Engineer, I Circle.

ENCLOSURE.

From G. W. WICKS, Esq., Port Officer, Cocanada, to the Superintending Engineer, I Circle, dated 25th February 1897, No. 1591.

In reply to your letter, No. C./54 of this date, and just received by me, I have the honour to request that you will suspend the work of closing the gap until your letter can be placed before a meeting of the Board which I will call as soon as possible.

2. This matter, I consider, is of such vital interest to the trade of the port that I hope you will take no immediate action to carry out your intention of closing the gap and that you will kindly stop the boats throwing in stone in the gap for the present.

From J. C. LARMINIE, Esq., M.I.C.E., Superintending Engineer, I Circle, to the Chief Engineer, Public Works Department, dated Waltair, 8th April 1897, No. 79 G.D.

With reference to your memo., No. 994 C. of 18th February 1897, I now have the honour to submit a tracing from the survey showing the exit from the Cocanada river, with the soundings and the condition of the shoal for the six months (October 1896 to March 1897), and to report as follows.

2. By the end of January, the southern jetty had been raised above high tide level, along its whole length, to the end of the 400 feet curve; the curved extension to the north jetty had also been formed, up to low tide level.

3. During February attempts were made by means of the two old bucket river dredgers from Dowlaiswaram, to open a passage through the bar, which at that time consisted of a ridge of sand about 150 feet wide, situated about half way between the ends of the jetties and the red and black buoys now marked on the tracing.

4. The weather was fresh and breezy nearly every afternoon, when a choppy sea got up, and without a proper steam tug the work was carried on under considerable difficulties. All that the bucket dredgers could do was to clear out two narrow parallel channels (the dredgers worked alongside each other). At very low tides also some excavation by manual labour was carried on.

5. Meantime, since the extension of the jetties, it had become apparent that powerful tidal currents were at work to and fro across the river mouth, to facilitate and induce some portion of these to enter between the jetties, the southern jetty was extended another 100 feet beyond the termination of the curve. This had some slight effect and served to indicate what might be expected were the gap in the southern jetty closed, for through this still, the main body of the tidal flow found its ingress and egress to and from the river.

6. The dredging on the bar merely served to show what might be attained by proper appliances, and the weather having become still more unfavourable, they were abandoned. Dowlaiswaram, and I then determined that at all hazards the gap should

8. In a subsequent meeting on 18th March 1897 when neither the President nor myself were present, it was resolved that on the slightest appearance of difficulty or delay to boats in getting over the bar, the gap should be again re-opened (presumably by the Board itself)!

9. Between the 16th and 20th March the gap was closed and since then there has been a steady improvement. As was anticipated, the powerful tidal current which hitherto passed in and out of the gap now scours up and down between the jetties, one result being the diminution of the sand accretion which had formed along the north jetty, opposite the gap, while the increased depth in the channel across the bar, between the buoys, points to its effect in this direction. Furthermore, the width of the bar has considerably decreased, not being now more than 50 or 60 feet wide, where the minimum depth at low tide as shown by the row of black figures on the tracing is $2\frac{1}{4}$ feet (actual soundings at low water give a little more).

10. Altogether, the results of closing the gap are most encouraging and as I had all along hoped for. The improved state of affairs is even admitted by the Port officer.

11. The sand bag dam across the gap may collapse at any moment; it is sinking daily as sand escapes through decay of the bags; so, keeping in view all the foregoing conditions, I have given orders to proceed at once with the filling in of stone over the bags with a view to permanently closing the gap. The old circuitous channel from the gap is deteriorating; so, under all the circumstances of the case, I think it would be folly to re-open it.

12. At the same time, it must be admitted that, occasionally, there may arise difficulties in the navigation over the bar. A strong cross current, from the north, sweeps across the opening between the jetties with the flood tide, while the reverse takes place on the ebb. With the wind fresh anywhere between north-east and south-east, a lumpy sea gets up, which, combined with the strong current, renders the passage difficult, considerably enhanced by the narrowness of the channel.

13. It has been suggested that, in accordance with the sanctioned estimate, the jetties should now be extended outwards so as to get out beyond the bar, which could then be easily dredged out. But I am quite satisfied that their present termination is as favourable as can be arranged and is particularly so in respect to the direction and set of the tidal currents on the bar. Were the jetties extended, this effect would be interfered with, while the formation of a new bar further out would inevitably result.

14. The balance of the estimate (Rs. 44,200) is provided in this year's budget. But if the foregoing view be accepted only a small sum will be required. Another point for decision is whether the jetty should be left in its present rough unsectioned condition. The estimate provides for building it to a uniform section, and the cost of doing so will be 24,527 cubic yards at annas 4 = Rs. 6,132.

15. In conclusion, I would again point out, that to maintain a really safe and satisfactory channel through the bar, a sand pump dredger is essential. The coast line north of the jetties is slowly advancing eastward—a condition most likely to tend to the eventual growth of the bar, outside the present position of the buoys and further removed from the scour of the ebb tides.

From J. C. LARMINIE, Esq., M.I.C.E., Superintending Engineer, I Circle, to the Chief Engineer, Public Works Department, dated Camp Dowlaiswaram, 27th June 1897, No. C./202.

I have the honour to invite

INSPECTION Notes of J. C. LARMINIE, Esq., M.L.C.R., Superintending Engineer,
I Circle, on Cocanada river jetties, dated 20th July 1897, No. C/310.

The whole of the southern extension has settled down, so that at full tide it will be nearly a foot under water.

The contractor should be instructed to at once bring down an additional 1,300 cubic yards of stone, when the work should be raised three to a width of six feet. Across the gap which has been faced with rough stone is a hollow in the middle over the sand bag core. This hollow has first to be filled in using all the small stone available, so as to close all the interstices through which the tide now flows to and fro. When the gap has thus been brought up to the general level of the rest of the work, the extra three feet of raising can then be carried out so as to bring the whole length of the wall to one uniform level. The work can be put in hand so soon as punts can be made available, the contractor doing the work.

700 yards now at site. Required $800 \times 2 \times 1 = 1,600$. It will be advisable to retain a small reserve of about 400 cubic yards.

The question of building the jetty to sanctioned section (6 feet top width, slopes $1\frac{1}{2}:1$) was referred to the Chief Engineer last April. It will not, however, be advisable to do anything in this direction until all settlement has ceased.

The condition of the bar has much improved, the width having decreased, so that it cannot now be more than 30 feet wide, if so much. This is due, no doubt, to the strong tidal currents to and fro across the river mouth, while the tidal current up and down between the jetties has deepened the channel and maintained and improved the channel out between the buoys. As has been reported to the Chief Engineer in this office No. 79 G.D., dated 8th April 1897, on no account should the jetties be ever extended beyond their present position, as to do so would interfere with and alter the tidal sweep across the mouth of the river.

ORDER—No. 2221 W., dated 14th August 1897.

His Excellency the Governor in Council observes that the Superintending Engineer's report of April last on the work done to the jetties at Cocanada is satisfactory and encouraging.

2. The Superintending Engineer's proposal to stop the extension of the jetties for the present is approved. They should, however, be neatly sectioned, the sectioning to the southern jetty being done when all settlement has ceased, as recommended in the Superintending Engineer's Inspection report of the 20th July 1897.

3. The proposal of the Gódvári District Ports Conservancy Board to purchase a dredger, is under consideration in the Marine Department.

(True Extract.)

(Signed) D. McNEIL CAMPBELL, Colonel, R.E.,
Secretary to Government.

To the Superintending Engineer, I Circle,
Public Works Accounts.

Marine Department

BUILDINGS AND ROADS.
CIVIL WORKS.

Government {1897} of Madras.
PUBLIC WORKS.

Recd.

Regd.

1897.

Enclosures

Spare copies

G.O., No. 2221 W., 14th August 1897.

12759 Mar 27-8-97

Communicated to the

Presy. Port Officer

AUGUST.

/s/ D. M. C.

J. The P. P. O.

Jetties at Cocanada

Observing that the Superintending Engineer's report of April last on the work done to the — is satisfactory and encouraging, and approving with remarks that officer's proposal to stop the extension of the jetties for the present.

No. 2221 W., 14th August 1897.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

READ—the following papers:—

Memorandum from the Chief Engineer, Public Works Department, to the Superintending Engineer, I Circle, dated 2nd December 1896, No. 1552 C.

On the strength of urgent petitions from persons in Cocanada stating that the port was likely to become closed up altogether unless something was at once done to improve its condition, a scheme for extending the groynes was prepared and sanctioned by Government. The Presidency Port Officer has lately visited Cocanada and has now represented to Government that the proposed works are unnecessary, and that things can quite well be left as they are till such time as the port can be removed to Vakalapudi. I therefore have the honour to request that you will, as early as possible, give me information on the following points:—

First.—In your opinion can the port be left as it is without fear of the passage out to sea becoming entirely blocked within the next three years. It seems to be possible that the floods in the Gódavari may have kept the passage opened and so temporarily removed all cause of anxiety, but that there will be the same state of affairs again as existed at the time the petitions were written.

I have asked the Port Officer for his opinion on this point, and yours must be given independent of his.

Second.—It is stated that it will be quite impossible to clear the sand bank between the two proposed groynes without using a sand pump dredger costing £12,000 or about 2 lakhs of rupees. Are you of this opinion? As far as I can judge there seems to be no reason why the bank should not be cleared by hand assisted by the dredger now belonging to the port. When the groyne has been constructed at each side of the channel, I do not see why it should be more difficult to clear the sand to 3 feet below L.W. in this case than it was in the case of the excavation of the Buckingham canal and many other canals that run into tidal water, or it would be in the case of excavating a canal to Vakalapudi which now seems to be the idea of the Presidency Port Officer. I further do not think that a sand pump dredger would be suitable for working in such shallow water.

If the sand bank cannot be cleared without two lakhs having to be spent on a dredger, the scheme for extending the groynes must fall to the ground.

Third.—What is the average time an ordinary sized cargo boat takes to make a trip to a steamer and back by the present circuitous route, and what would be the average time if the channel were made by groynes as proposed, and what are the daily working expenses of such a boat. Supposing a boat carrying 20 tons and costing Rs. 5 a day to work only makes one trip by the present route while it would be able to make two by the proposed one it is evident that in the latter case 40 tons would be carried for the same cost as 20 in the former.

Fourth.—At what stage has the groyne work lately sanctioned arrived and how long will it take to complete. I will be much obliged if you will give me a very early answer to these questions, and I think it will be well if you consult several of the merchants interested as their opinions may not be the same as that of the Port Officer.

No. 2221 W., 14th August 1897.

Telegram from the Superintending Engineer, I Circle, dated Dowlaishwaram 8th December 1896.

From J. C. LARMINIE, Esq., M.I.C.E., Superintending Engineer, I Circle, to the Chief Engineer, Public Works Department, dated Gopalpur, 8th January 1897, No. C./5.

In reply to your memo. No. 2 C. of the 2nd instant, I have the honour to state that I do not see how I can offer a more definite opinion regarding the clearance of a channel through the sand bar at the mouth of the Cocanada river than that already given throughout the correspondence on the subject; paragraph 4 of my letter, No. 1955 G.D., dated 17th December 1896, specifies the various references on the subject, winding up with my letter, No. C./247 of 21st October 1896, submitting the jetty estimates for sanction.

2. That the necessity for the provision of a sand pump dredger had, up to date of your memo. No. 4552 C. of 2nd December 1896, been contemplated and as I understood, tacitly admitted, appears from the following references on the subject.— paragraph 18 of your note printed with G.O., No. 2445 of 24th August 1896; clause 4, paragraph 19 of the same note, resulting in the orders passed in G.O., No. 2805 of 30th September 1896, directing me to submit an indent for a sand pump dredger and your subsequent telegram of 24th October 1896 to hasten despatch of the same.

3. From these, I inferred that all difficulties were now at an end and looked on the future efficiency of the port as quite an assured fact, while in Cocanada the apparently near realization of so long felt a want was regarded quite as a matter for congratulation.

4. With reference to paragraph 2 of your memo. under reply, I would invite a re-perusal of paragraphs 8, 9 and 10 of my report, printed with G.O., No. 2445 W. of 24th August 1896. From these three paragraphs alone it would appear that (in the opinion of the writer) a dredger was an integral part of the scheme.

5. Your own opinion of the "Wenlock" is stated in paragraph 18 of your note printed with the same Government Order.

6. With reference to your paragraph 4, I would observe that there will be ample time before the completion of the jetties, in which to procure the dredger. Stone is being deposited as quickly as possible, but it will take some time yet to complete the total supply even at the rate of 3,000 cubic yards per month (estimated quantity 28,000 cubic yards) and time must be allowed for it to settle before any attempt is made to build on section it.

7. So soon as stone has been deposited all along the line of the wall to above half tide level, I then intend making an attempt to clear the highest part of the shoal by manual labour.

8. Could a channel giving a depth of six feet at even half tide be opened out, I believe the merchants would offer no great objection to the closing of gap A in the south jetty. Until this is done, no particular result can be expected from the work, and it was with this object in view, that all along, I have so strenuously advocated the provision of suitable dredging plant.

From J. C. LARMINIE, Esq., M.I.C.E., Superintending Engineer, I Circle, to the Chief Engineer, Public Works Department, dated Cocanada, 15th February 1897, No. C./66.

In reference to G.O., No. 3187 W. of 7th November 1896, directing me to report on a note by Mr. J. R. Bell regarding the possibility of preventing further ingress of Gódavari silt into Cocanada Bay, I have the honour to submit the following observations, having delayed doing so, until other engagements permitted of my making an inspection of the river outlets in question.

2. Even were such a scheme practicable, at a moderate expenditure, it would be quite unnecessary, for, it has apparently escaped Mr. Bell's notice, that all the trouble at Cocanada is due, not to the advance of Gódávári mud from the south, but to the travel of sand along the beach from the north due to the strong littoral current.

3. The view expressed in paragraph 10 of Mr. Bell's note is quite contrary to observed facts. With the extension of the northern jetty, the coast line for some little distance to the north of it, has advanced owing to the accretion of sand deposited by the aforesaid littoral current. This advance has continued until it has, as described by Mr. Bell in his 10th paragraph "enfolded the mouth of the canalized river"; but with this difference, that instead of being caused by mud from the south, all the damage has been caused by the travel of sand from the north!

4. Under these circumstances it seems almost superfluous to discuss the question of the exclusion of silt any further. But as the formation of Gódávári Point, and the extensive deltaic tracts around Hope Island, are entirely due to silt deposited by the Gódávári in the course of the last fifty-five years (they were in embryo in 1842, when the survey for the Atlas sheets was made) a few remarks in this connection may not be out of place.

5. As far as I can judge from observation and the available marine surveys, the deposit of Gódávári silt has now reached its extreme northly limit and a change has * set in.

6. I would here invite a re-perusal of paragraphs 17, 18, 19 and 20 of my report printed with G.O., No. 2445 W. of 24th August 1896. Paragraphs 19 and 20 read as follows:—

The charts show that as Point Gódávári extended northwards, so the bay to the west and south-west of it scours out. From 1875 to 1882, the change is marked, from 1882 to 1891, there is further improvement and particularly in the direction which affects the mouth of the Cocanada river, i.e., the advance towards it of the one fathom contour.

Paragraph 20.—In 1875, the nearest point of this contour was fully two miles from the river mouth. In 1891 the distance had decreased to something over a mile. The southern part of the bay, which in 1875 exposed extensive mud flats at low tide, is now a sheet of water of from 1 to 2 feet in depth.

In paragraph 23 of the above-mentioned report the trifling advance of Point Gódávári between the years 1882 to 1891 is alluded to.

7. All these considerations indicate, in my opinion, the inexpediency of undertaking a costly work to prevent what nature herself is now striving for and has already in a great measure attained.

8. The whole tendency of the Gódávári during recent years has been to reserve its former action, the principal opening being now to the south (instead of as formerly to the north into Cocanada Bay) through the channels marked A on the accompanying tracing from the Marine Survey of 1891.

9. A comparison of this with the old Atlas sheets of 1842 will show how the southern branches marked B, C, D have opened out, thereby causing the growth of the Sacramento shoal.

10. This opening out is no doubt due to the shoaling up of the northern branches at their entrance into Cocanada Bay and consequent inability to afford a free discharge to flood water and this change of régime, in itself, reduces to a minimum, the amount of silt now brought into the bay, a quantity which, in recent years, has done no appreciable harm.

11. It seems unnecessary to discuss the difficulty and expense which would be involved in the construction of an embankment like that advocated by Mr. Bell across the low-lying mud flats and a wide and deep (where the bank would cross) branch of the river. Considerable inconvenience to trade would also be caused by the closure of the Coringa river, in which the French Settlement of Yanam has vested interests.

From J. C. LARMINIE, Esq., M.I.C.E., Superintending Engineer, I Circle, to the Port Officer, Cocanada, dated 25th February 1897, No. C./54.

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2. I am aware that this procedure is somewhat opposed both to your own and the opinions of some of the merchants on the subject. But, responsible as I am for the success of a scheme on which Government have expended so much money, I can defer the closure no longer.

3. Until this gap is closed no material result can be expected from the extension of the southern jetty.

4. As you are well aware, the channel from the gap into the bay is threatened by the advance southwards of the sand shoal, so that the necessity for the provision of another exit becomes daily of greater urgency.

5. There is no other alternative but the passage across the bar, and any further delay will only accentuate the difficulty and expense of clearing it (the bar).

6. I do not anticipate that the closing of the gap will cause any very serious inconvenience to shipping operations. Even now boats have often to wait for a rise of tide before coming into the river through the gap. When it is closed, and for some little time after, at all events, arrangements must be made not to despatch boats over the bar within a certain period, before low water and after the turn of the tide. This period, probably, will be four hours before low water and two hours after turn of the tide, for boats drawing $4\frac{1}{2}$ feet of water.

7. Under these circumstances, I have the honour to request you to be good enough to intimate to the boat owners generally the closure of the gap with any other instructions to them you may consider necessary. For some little time after closure of the gaps, the loading of the boats should be done with judgment.

No. C./55.

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25th February 1897.

(Signed) J. C. LARMINIE,
Supg. Engineer, I Circle.

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I have the honour to state in reply to your letter, No. 1591 of to-day, that to give up the intention of closing the gap means, to all intents and purposes, the abandonment of a scheme in which so much money has been expended. The question is purely an engineering one for which I am responsible. I must again repeat that, until the gap is closed, no real progress can be made on the bar and if we are to wait until a perfect channel, navigable at all states of the tide, is ready before the closure of the gap is started, it means postponing indefinitely the improvement of the port. If the gap cannot now be closed, dredging must cease as it is a waste of money trying it any further. As, however, the channel over the bar is not buoyed out, I shall postpone further action, until next Wednesday, to enable you to do so.

No. C./78.

Copy forwarded to the Chief Engineer, Public Works Department, for information in continuation of this office No. C./55 of to-day, together with a copy of letter No. 1591 * of the same date, to which it is a reply.

* From the Port Officer, Cocanada.

25th February 1897.

(Signed) J. C. LARMINIE,
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2. This matter, I consider, is of such vital interest to the trade of the port that I hope you will take no immediate action to carry out your intention of closing the gap and that you will kindly stop the boats throwing in stone in the gap for the present.

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6. The dredging on the bar merely served to show what might be attained by proper appliances, and the weather having become still more unfavourable, they were sent back to Dowlaisheram, and I then determined that at all hazards the gap should be closed.

7. Several members of the Port Conservancy Board were strongly opposed to this course, being unwilling to risk a stoppage of communication with the shipping for even a brief period. However, at a meeting of the Board held on the 27th February, it was decided after some discussion that the gap might be closed as a tentative measure with bags of sand (see this office endorsement on the Proceedings, No. 2545 G.D., dated 4th March 1897).

8. In a subsequent meeting on 18th March 1897 when neither the President nor myself were present, it was resolved that on the slightest appearance of difficulty or delay to boats in getting over the bar, the gap should be again re-opened (presumably by the Board itself)!

9. Between the 16th and 20th March the gap was closed and since then there been a steady improvement. As was anticipated, the powerful tidal current which erto passed in and out of the gap now scours up and down between the jetties, result being the diminution of the sand accretion which had formed along the north jetty, opposite the gap, while the increased depth in the channel across the bar, between the buoys, points to its effect in this direction. Furthermore, the width of the bar has considerably decreased, not being now more than 50 or 60 feet wide, where the minimum depth at low tide as shown by the row of black figures on the tracing is $2\frac{1}{2}$ feet (actual soundings at low water give a little more).

10. Altogether, the results of closing the gap are most encouraging and as I had all along hoped for. The improved state of affairs is even admitted by the Port officer.

11. The sand bag dam across the gap may collapse at any moment; it is sinking daily as sand escapes through decay of the bags; so, keeping in view all the foregoing conditions, I have given orders to proceed at once with the filling in of stone over the bags with a view to permanently closing the gap. The old circuitous channel from the gap is deteriorating; so, under all the circumstances of the case, I think it would be folly to re-open it.

12. At the same time, it must be admitted that, occasionally, there may arise difficulties in the navigation over the bar. A strong cross current, from the north, sweeps across the opening between the jetties with the flood tide, while the reverse takes place on the ebb. With the wind fresh anywhere between north-east and south-east, a lumpy sea gets up, which, combined with the strong current, renders the passage difficult, considerably enhanced by the narrowness of the channel.

13. It has been suggested that, in accordance with the sanctioned estimate, the jetties should now be extended outwards so as to get out beyond the bar, which could then be easily dredged out. But I am quite satisfied that their present termination is as favourable as can be arranged and is particularly so in respect to the direction and set of the tidal currents on the bar. Were the jetties extended, this effect would be interfered with, while the formation of a new bar further out would inevitably result.

14. The balance of the estimate (Rs. 44,200) is provided in this year's budget. But if the foregoing view be accepted only a small sum will be required. Another point for decision is whether the jetty should be left in its present rough unsectioned condition. The estimate provides for building it to a uniform section, and the cost of doing so will be 24,527 cubic yards at annas 4 = Rs. 6,132.

15. In conclusion, I would again point out, that to maintain a really safe and satisfactory channel through the bar, a sand pump dredger is essential. The coast line north of the jetties is slowly advancing eastward—a condition most likely to tend to the eventual growth of the bar, outside the present position of the buoys and further removed from the scour of the ebb tides.

From J. C. LARMINIE, Esq., M.I.C.E., Superintending Engineer, I Circle, to the Chief Engineer, Public Works Department, dated Camp Dowlaisheram, 27th June 1897, No. C./202.

I have the honour to invite your consideration of my report, No. 79 G.D., dated 8th April 1897, on the Cocanada river

* See paragraph 14 of above letter.

jetties, and to request orders on the question of building the wall to sanctioned section.* The gap is now permanently closed with stone and all traffic passed to and fro over the bar.

INSPECTION Notes of J. C. LARMINIE, Esq., M.I.C.E., Superintending Engineer, I Circle, on Cocanada river jetties, dated 20th July 1897, No. C/310.

The whole of the southern extension has settled down, so that at full tide it will be nearly a foot under water.

The contractor should be instructed to at once bring down an additional 1,370 cubic yards of stone, when the wall should be raised three to a width of feet. Across the gap which has been faced with rough stone is a hollow in the middle over the sand bag core. This hollow has first to be filled in using all the small stone available, so as to close all the interstices through which the tide now flows to and fro. When the gap has thus been brought up to the general level of the rest of the work, the extra three feet of raising can then be carried out so as to bring the whole length of the wall to one uniform level. The work can be put in hand so soon as punts can be made available, the contractor doing the work.

The question of building the jetty to sanctioned section (6 feet top width, slopes $1\frac{1}{2}:1$) was referred to the Chief Engineer last April. It will not, however, be advisable to do anything in this direction until all settlement has ceased.

The condition of the bar has much improved, the width having decreased, so that it cannot now be more than 30 feet wide, if so much. This is due, no doubt, to the strong tidal currents to and fro across the river mouth, while the tidal current up and down between the jetties has deepened the channel and maintained and improved the channel out between the buoys. As has been reported to the Chief Engineer in this office No. 79 G.D., dated 8th April 1897, on no account should the jetties be ever extended beyond their present position, as to do so would interfere with and alter the tidal sweep across the mouth of the river.

ORDER—No. 2221 W., dated 14th August 1897.

His Excellency the Governor in Council observes that the Superintending Engineer's report of April last on the work done to the jetties at Cocanada is satisfactory and encouraging.

2. The Superintending Engineer's proposal to stop the extension of the jetties for the present is approved. They should, however, be neatly sectioned, the sectioning to the southern jetty being done when all settlement has ceased, as recommended in the Superintending Engineer's Inspection report of the 20th July 1897.

3. The proposal of the Górávari District Ports Conservancy Board to purchase a dredger, is under consideration in the Marine Department.

(True Extract.)

(Signed) D. McNEIL CAMPBELL, Colonel, R.E.,
Secretary to Government.

To the Superintending Engineer, I Circle.
" Examiner, Public Works Accounts.
" Revenue Department.
" Marine Department.
" Financial Department.