Archives I—10,006—16-8 77.

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(2) Date of repair 9-4-87

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IL NADU ARCHIVES

RNMENT OF TAMIL NADU

PWD DEPARTMENT

G.O. No. / B.P. No. 1718, 1719 - W - Press. / Mis.

Dated 8 - 7 - 1882. ~~197~~.

K-m-K.

olded or roughly handled

List of Plans sent to Mr. Molesworth.

61

1- Chart of the Bay of Bengal.
2. Survey of the Vizagapatam Harbour & part of back Water. No. 1 & 2.
3. Longl. Sections along the Sea & back Water near Vizagapatam No. 3.
4- Sketch map section & levels near town of Vizagapatam. No. 4.
5- Proposed Groynes on the beach at Vizagapatam.
6 Survey of the Sea port & backwater of - do -
7- Key plan shewing the position of the sections taken across the Backwater in the months of October 1879 - at Vizagapatam.
8. Cross sections taken across the backwater at Vizagapatam.

22nd Feby/82.

Sd Lumley Ph
the Engineer

P. W. DEPARTMENT.

62

READ the following :—

Endorsement, Political Deptt No: 46 dated 24th January 1882.

Letter from the Govt. of India No: 82 dated 13th February 1882.

FOR ORDERS.

C. W. Hankey
Colonel R.E.
Secy. to Govt. P.W. Deptt.

R.S.

The C.E. had better speak with Mr Parker on the subject of these Reports. I suggest that [illegible] [illegible].

The work must not interfere with the primary duty of the Harbour Depart. [illegible]

50/4 50 1218/1-

8TH JULY 1882, No. 1718 W., PUBLIC WORKS.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

General. Establishment Buildings & Roads Civil Works

No. 54

READ—again the following G.O., dated 9th March 1882, No. $\frac{612}{A}$ W., Public Works.

Read—the following papers :—

From the Acting Resident of Travancore and Cochin, dated 18th January 1882, No. 8.
From the Government of India, dated 13th February 1882, No. 82 M.

Order—dated 9th March 1882, No. $\frac{612}{A}$ W., Public Works.

Mr. Parkes having now submitted to Government his report on the best method for reconstructing the Madras Harbour Works, may consider himself at liberty to proceed by the next B.I.S.N. Steamer to Vizagapatam.

2. After examining the capabilities of that port, as also those of Bimlipatam and Calingapatam, for the formation of first-class harbours, he should return to Madras and subsequently proceed by Beypore to Quilon with the same object.

3. On the completion of the special duty adverted to Mr. Parkes may return direct to England, if possible, however, submitting his reports on the several ports to this Government before his departure.

4. Should he be unable to do this, he may draw up and forward the reports at an early date from England.

5. While engaged on this special duty Mr. Parkes's Indian pay at £160 will be in abeyance, but he will be entitled to a fee of £10-10-0 for each day while so specially engaged. Sundays may be included in the demand, and all *bonâ fide* travelling and hotel expenses will be met by Government, who will further, if desired, make the bills payable in England.

6. While engaged on the examination of the Quilon Harbour, Mr. Parkes's expenses will be defrayed by the Travancore Government. The charges will commence from the date on which Mr. Parkes leaves Madras for Quilon and end on date of embarkation for England at Colombo.

7. The following telegram has been despatched to the Collector and Agent at Vizagapatam :—

> "Government desires that all needful aid be afforded Parkes, who leaves by steamer to-day to report on the Vizagapatam and Calingapatam Harbours. Please warn Executive Engineer and Port Officer."

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Government, P.W.D.

FOR ORDERS.

Government of Madras,
Public Works Department,
Stonehouse, Ootacamund,
188

[illegible]

My dear Mr Huddleston

In speaking to Mr Molesworth this morning I suggested ~~that~~ he & Mr Stoffe should visit Vizagapatam Bimlipatam & Calingapatam en route to Calcutta

1212/2

54A

No.

Read—also the following papers :—

From W. PARKES, Esq., M. Inst. C.E., to the Secretary to Government, Public Works Department, dated Madras, 5th April 1882.

Having now made the inspection of the three ports of Vizagapatam, Bimlipatam, and Calingapatam as instructed by the G.O., No. $\frac{612}{A}$ W., dated 9th March 1882, I have the honor to report the results.

2. I should explain at the outset that my remarks will be necessarily of a very general character. With respect to the two latter places, I was unable to obtain any charts or plans whatever more detailed than the trigonometrical survey to a scale of 4 miles to an inch, and a navigating chart on which the 67 miles between the two extreme ports is shown on 3 inches of paper. The local authorities were not in possession of the more detailed coast charts issued by the Marine Survey Department, which, however, I had an opportunity of inspecting on board the steamer which conveyed me up the coast.

3. In respect of Vizagapatam, I was furnished with a voluminous file of papers and several plans (herewith returned). These contain much valuable information, but are by no means complete for the special purpose of my inspection.

4. Some of my conclusions, therefore, are necessarily subject to revision by the results of more complete information, but I will take care to indicate where they are subject to reserve on this account.

5. I would also beg to call attention to the rather large disproportion between the terms of my instructions (the capabilities of the ports for the formation of first-class harbours) and the circumstances of the ports themselves. I need hardly say that the present trade of the ports offers no prospect of the expenditure on first-class harbour works being productive, but to give an idea of the magnitude of the discrepancy, I may say that if the present trade of Vizagapatam and Bimlipatam were combined, and the trade of the joint port multiplied tenfold, the saving in the landing and shipping charges (which I believe to be the only proper source of harbour revenue) would scarcely pay interest on the sum required for providing sheltered berths for the ships frequenting the port.

6. With such a very remote prospect, therefore, of the question becoming a practical one, I think it better to abstain from giving anything like designs for the possible harbours of the future, but merely indicate the points in which I think one or the other locality has a *prima facie* superiority.

7. As shown by an outline map of the coast, the three ports have a certain similarity. Each has the same aspect, about south-east; each is situated in a shallow indentation or bight of the coast, formed by a projecting point of land to the southward; each has a river discharging in its immediate neighbourhood. I may add that they are alike very favorably situated for the Masulah boat system of communication. The cost of landing and shipping is less than in the Madras roads; interruptions from bad weather are much less frequent, as are also complaints of damage to cargo. The cost at Madras from the roads is Rs. 1-4-0 per ton, at Vizagapatam and Bimlipatam it is As. 10, and at Calingapatam As. 10-8 for half the year and one rupee for the other half. The burst of the north-east monsoon is less violent on this part of this coast than at Madras, and heavy seas from the northward are unknown. Cyclones are said to be more rare than they are either to the northward or southward. In a word, the three ports were represented to me by the local authorities, and apparently with truth, as being singularly well situated for carrying on a much increased trade upon the present system, and practically without interruption at all seasons of the year.

8. The above description applies to all three ports. I have now to describe the peculiarities of each in reference to its capabilities for the formation of a first-class harbour. It will be convenient to begin with Calingapatam.

FOR ORDERS.

and as they agreed
I promised to
get them the papers
Those however!
[illegible] which are in
circulation inter
you and my Asst.
Mr Parsons who
takes this note
will receive them

if you think it
desirable that
the posts should
be visited & as
proposed — my
belief is the
G.G. would approve

Believe me
yours truly

Stanley

9. Calingapatam.—The projection which forms the bay in this case is a low promontory, terminating in two reefs of rock which run out some distance into the sea. The landing place is about two miles north of this, and a mile further is the mouth of the river. No use is made of the latter as a boat harbour, the boats being hauled up on the beach. They are smaller than those of Madras, carrying only $1\frac{1}{2}$ instead of 2 tons. Ships anchor a little over half a mile from shore in 5 fathoms at low water. The tonnage of exports and imports was as follows:—

	Exports.	Imports.	Total.
1880-81	24,000	323	24,323
1881-82	12,253	203	12,456

The trade of 1880-81 was swelled by the large shipments of rice. The demand for this occurs at intervals averaging about five years.

10. With respect to the capabilities of this port for a first-class harbour, it is impossible, with my present information to form more than the negative conclusion that I can see no reason why it should not be formed at the southern end of the bay, utilizing the reef of rocks as far as it goes to seaward for the foundation of a breakwater, which would then be turned northward and continued along the 6 fathom line parallel to the shore for a sufficient distance, say a mile, at a cost approximately of 50 lakhs. There is good stone at Garrah Hill, 4 miles distant.

11. This conclusion, however, should be subject to reconsideration by the help of a complete hydrographical survey of the locality, and especially in reference to the correctness of my present impression that the offing currents and the transporting influence of the alongshore wave are sufficiently preponderating from the southward to prevent any conveyance of the solid matter brought down by the river floods towards the harbour. It is against Calingapatam that the river mouth is not available as a boat harbour.

12. Bimlipatam.—In this case the projecting point of land at the south end of the bight also terminates in a reef of rocks running out to sea, but it differs from Calingapatam in the fact that the river discharge is quite close to the point, in fact impinges upon it during times of flood. The river mouth is used as a boat harbour whenever practicable, the Masulah boats (which are rather longer than those of Madras, carrying $2\frac{1}{2}$ tons) loading on the sheltered beach within. At times, however, this is closed in consequence of the shallow water on the bar, and then they load and discharge on the exposed sea beach. The anchorage is about the same distance from shore as at Calingapatam and at the same depth, viz., a little over half a mile for 5 fathoms. The tonnage in 1880-81 was exports 17,946, imports 3,401; total 21,347.

13. With respect to the capabilities of Bimlipatam for a first-class harbour, I think there is a very strong *prima facie* objection in the existence of the river mouth so close to the site of the harbour. The river is insignificant at ordinary times, but in floods it fills the eleven arches of a bridge, each 30 feet span and 15 feet high, with a torrent of silt-laden water. The solid matter thus carried to the sea is dispersed by the waves and currents over a large area, so that its effects are imperceptible upon the coast; but if those dispersing forces were interfered with, which it is the very object of a harbour to do, the movement of the solid matter would be arrested, and it would remain as an accumulation possibly extensive enough to neutralize in a couple of days the effects of several years' work. I think, therefore, that the bight of Bimlipatam should be avoided as a site for first-class harbour works.

14. I would, however, beg to recommend that a series of systematic surveys be made of the Bimlipatam coast and backwater—first, because I believe they would lead to results of considerable importance to hydrographic science, and, second, because I think they would indicate some practicable means of lessening the evil, to which the port is now liable, of the constantly shifting bar.

15. I cannot do more with the data now before me than indicate the general direction in which such improvement seems to be possible. The river takes a southerly

FOR ORDERS.

45

CAW

Keep with file

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course for about a mile before falling into the sea, and when in flood impinges upon the northern side of the low promontory which forms the southern extremity of the bight, and then opens a channel through the sand close to the rocky reef which projects from the promontory. The channel so formed has been known to have a depth of upwards of 16 feet at low water. The tendency of the prevailing northerly drift of sand, however, is to force the channel northward, and at the same time to shallow it, as the floods slacken. In this way the channel, as it is forced to the northward, is only kept open by the scour of the tidal water flowing in and out until it reaches a permanent sand hill at about 800 feet distance. There it remains till a new land fresh re-opens the southern site again and closes the northern one. There is therefore a continual oscillation of the channel between these two extremes, and at times it is so shallow and the surf so high across it that boats cannot enter or leave it.

16. I think it quite possible that this northerly drift of sand by sea action might be found preventible by an inexpensive groyne of rough stone to the southward of the flood-made channel, but the proposal should be reconsidered in view of, at least, two complete surveys, one immediately after the periodical floods in October and the other in April, after the northerly sea-drift has been for some time in action.

17. A screw pile pier has been suggested, but I fear the cost of this, if carried out sufficiently beyond the shifting shore line to have permanent deep water alongside, would be more than the trade of the port would warrant. The possibility of a permanent access to a constantly smooth backwater should, I think, be at any rate first considered.

18. VIZAGAPATAM.—Here the projecting point which forms the bight is a bold headland 500 to 600 feet high, with precipitous slopes on the north and east. It consists of a gneiss rock of variable quality, much of which is disintegrating under the action of the air and sea, and masses have fallen down and form a rocky foreshore for some distance into the sea. The mouth of the river is close to the northern face of the point, and is fixed in that position by a detached hill (Ross's Hill) on the opposite shore, the channel lying between the two. To the northward the shore is a sandy beach on which the town of Vizagapatam is built. The anchorage is half a mile from the beach in a depth of 5 to 6 fathoms. Masulah boats carrying 2½ tons convey the goods to and from the river mouth, within which they always load and discharge. When they cannot cross the bar, which very rarely happens (fifteen such occasions occurred in the last two years), the port is considered closed. The tonnage of 1880-81 was exports 9,495, imports 1,745; total 11,240.

19. The Vizagapatam river is much smaller than that of Bimlipatam, having only one-fourth the area of catchment basin, and of course only a proportionate intensity of floods. On the other hand, the tidal backwater is much larger, and consequently the tidal scour more powerful. The interior of the backwater is much used for docking native vessels.

20. On the whole I consider the natural advantages of Vizagapatam for harbour accommodation of whatever class, whether shelter for Masulah boats, or shelter for first-class steamers be required, to be superior to those of either Calingapatam or Bimlipatam, and I think the port is well adapted for developing an increasing trade. The advantages are—

1*st*.—The deeper water near shore, by which the extent of the sea works necessary for a first-class harbour will be diminished.
2*nd*.—The large tidal backwater by means of which channels at once navigable for boats, and which by proper means may be gradually made navigable for larger vessels and even ultimately for first-class ships, far in the distant future as this may now appear.
3*rd*.—The more moderate and manageable volume of the land floods.
4*th*.—The more favorable position of the river mouth with reference to the effects of flood discharges on possible future works.
5*th*.—The abundance of material for works of construction.

FOR ORDERS.

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with

Ste. W 46

The documents
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with his report on
~~the [illegible]~~
parts &c — in this
case, they need not
be put up with the
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20/4

Arnold

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Pardon reports on the
[illegible] Port are [illegible]
(47) 18/6

21. If Vizagapatam ever becomes a place of great trade, the facilities for carrying on that trade will be added step by step, and by the time great works for sheltering ships are required, the conditions of the case will be very different from the present. I think, therefore, that any designs based upon our present knowledge would be only purposeless speculation. Let it be borne in mind that with ships anchored in the roads as at present, thirty times the present trade might be carried on, and yet the arguments in favor of a first-class harbour would be only one-half as cogent as they were in the case of Madras eight years ago. I can only now say that if in that distant future a harbour outside the Dolphin's Nose is required, it can be made. If, on the other hand, an inland dock is preferred with a deep water approach, such a scheme would be perfectly practicable, but my insight into futurity will not permit me to speculate on the scale of the works or on their cost.

22. A far more practical question is how to facilitate the operations of trade in the earlier steps of its anticipated development. The means must be sought in the removal of the existing impediments to the free passage of Masulah boats in and out of the mouth of the backwater, and in the subsequent further enlargement of the latter, so as to allow of the use of larger cargo boats.

23. Small as this object is compared with the construction of a first-class harbour, it is one which requires for its design a far more elaborate preliminary investigation. The object is, of course, the permanent lowering of the bar, which lies a little outside the narrowest part of the entrance. The difficulty of the question is shown by the number of theories which have been put forward to account for the existence of the bar, and the still greater number of remedies which have been proposed for the evil. There is only one feature which is common to all these theories and proposals, viz., that they are based on insufficient data. If these were furnished, as they may easily be, I believe the true remedy would become apparent, and though it might not be within the immediate resources of the port to carry it out, it would be a satisfaction to know that the object is attainable in the near future.

24. I would therefore beg to conclude my remarks on Vizagapatam with two recommendations of a practical character, although they have more immediate reference to the earlier steps of harbour improvement than to the more distant object of first-class harbour accommodation.

25. My first recommendation is that a complete hydrographic survey of the harbour and roadstead be made to a scale of, say, 4 inches to the nautical mile, or 1,500 feet to an inch. This should include the whole of the backwater, showing distinctly the contours of ordinary and extraordinary high-water mark, and, where possible, the limits and levels of land floods; also the general levels of the overflowed marshes within the backwater. In addition to this (and this is with the view of furnishing the data which appear now to be wanting) a survey to a larger scale, say 150 feet to an inch, of the immediate entrance, that is, of the channel from the western ferry outwards continued to the 4 fathom contour seawards, and bounded on the north by a line drawn east from the Ice House, and on the south by a line drawn east from Mr. McMurray's Bungalow on the Dolphin's Nose. This survey should be repeated four times in the year, say in February, May, August, and November. By these surveys the changes in the form of the bar and entrance channels due to seasonal influences would be seen. Observations on the velocity and courses of the tidal currents, especially on the ebb, should also be made. A float sunk as deep as it can be to pass over the bar should be started at each successive hour of the ebb of an ordinary springtide, and its exact position at every 5 minutes noted. Similar observations of a floodtide would also be desirable, but the Surveyor would have to use his own judgment as to where the floats should be started so as to get into the harbour.

26. With the information afforded by those surveys and observations, I have no doubt a competent Engineer would be enabled, with something approaching absolute certainty, to state to what extent and at what expense the entrance channel could be made to have a permanent position and increased depth.

FOR ORDERS.

This is dated 24/2.
& there is nothing
to show that this
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27. My second recommendation is that some final and definite arrangement be made regarding the right of reclamation of marsh land in the tidal backwater, and that the arrangement be based upon the principle that the flow and ebb of the tide is essentially the property of the Port authorities, and ought not, without special evidence that the interests of trade and navigation will not be thereby damaged, to be alienated for any other purpose whatever. This is a fixed principle of Port Conservancy, and one which should be most jealously guarded. No doubt there are many exceptions, cases in which the enforcement of the rule would be absurd. Bombay may be taken as an instance, but the rule has none the less a presumptive force, and the exceptions must be individually proved on special local grounds. I do not think Vizagapatam is an exception. Every square foot of capacity of the tidal channels is required for navigation, and every one of the marsh that is cut off from the tidal overflow is so much loss to the channels.

28. The original concession to the Roman Catholic Mission appears to have been made in ignorance of this principle, and when, at a subsequent stage, the principle was asserted, it was treated rather as a matter of debatable theory than as the assertion of an acknowledged right. I think the Government should now take their stand upon this latter ground, and claim the rights to the tidal backwater as a whole on behalf of trade and navigation. With my present knowledge I should hardly be justified in suggesting a limit to the practical application of this claim, but I confess to a strong feeling that where the enclosed areas have not been brought under actual cultivation, it would be worth while to demolish the embankments and restore the tidal overflow. At any rate, a continuance of the system of reclamation by embankment will undoubtedly lead to the obliteration of Vizagapatam as a second-class port.

29. It must not be supposed that the loss of tidal water can be compensated for by any utilization of the land floods. As a rule—subject no doubt to many exceptions—tide water is beneficial and river water is injurious to the entrance of a harbour. The river water brings constant accessions of solid matter which must form a cumulative deposit somewhere. Tide water has no such tendency when once the channels are fully opened out.

30. But while I most strongly deprecate reclamation by embankment, there is another kind of reclamation which I think might be carried out with profit to the reclaimer and advantage to the harbour. This is to raise the whole area of a portion already near the level of high water by means of material dug from the marsh itself at a level between high and low water marks. This of course is more expensive than embanking, and might not be remunerative for mere agricultural purposes, but the land gained would be more immediately productive, and if the town should require extension towards the backwater, valuable building sites might be thus obtained. It should be a condition that the excavations be in continuous trenches, which would favor the flow of tide along them, and not in detached pits. I may mention that this system of reclamation has been carried out to a considerable extent at Kurrachee by private enterprise and with profitable results.

31. I would beg in conclusion to express my acknowledgment of the assistance and information furnished to me by the Port Officers at the several ports, Captain Jarvis, Captain Minto, and Captain Farley; also by Mr. Nordmann, C.E., who had given much attention to the harbour of Vizagapatam nine years ago, and made an excellent survey of a portion of it. To gentlemen connected with the mercantile firms of the three places I am also indebted for much information and kind hospitality.

No. 5 E.

Referred to the Master Attendant, Administrative Department, Madras, for remarks.

12th April 1882. (Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Government, P.W.D.

FOR ORDERS.

Arnold.

These papers can now be attached to the originals of the G.O. disposing of Mr Parkes' reports on Vizag, Bimlipatam &c.

Cu
14/7/82

98

Hon. D. F. Carmichael

C W 3192

For orders

The annexed correspondence & draft order have been seen and approved by H.E. the Governor and the Hon. Mr Huddleston and will now be disposed of in the manner proposed if the H.M. sees no objection.

12.6.82

We must see the proofs

CAW

All the letters &c should now be printed with the order

14/6/82

& instruction

R.S. 15/6

Cu B.C. - R 14/6

SAW

Please attend to the

54B

No. 2.

From J. H. TAYLOR, Esq., Lieut., R.N.R., Master Attendant, Administrative Department, to the Secretary to Government, Public Works Department, dated Madras, 13th May 1882, No. 4039.

In returning Mr. Parkes' memorandum on the ports of Vizagapatam, Bimlipatam, and Calingapatam, I have the honor to remark that that gentleman has very correctly demonstrated the inability of the trade of these ports, either singly or combined, to furnish any return worth speaking of for the outlay that would be required for a first-class harbour. Mr. Parkes justly observes that the returns from trade might be multiplied tenfold and yet not justify the expense. For convenience of shipping and discharging cargo, Bimlipatam has at present a great advantage over the others. It is very rarely that business is interrupted by weather, whereas Vizagapatam and Calingapatam are both dangerous and inconvenient, one from the nature of its bar, the other from that of its beach. The trade of Vizagapatam and Bimlipatam might be amalgamated, but no railway having its termination at either of these ports, and penetrating in a direct line to Raipore, would in my opinion much affect the trade of Calingapatam and Gopálpur, both of which are very large and improving ports. It is the peculiarity of the East Coast of this Presidency that, no matter from what district a full crop of food-grain, oil, gram, indigo or other produce issues, there is invariably a fairly convenient port ready for its shipment. What more can be desired? Mr. Parkes points out that careful survey should precede any official opinion about a harbour, and full understanding arrived at regarding the currents, sand movements, &c. That is an obvious truth. He seems to consider that the mouth of the Bimlipatam river, if it opened into a harbour, would be very injurious to its use during heavy freshes and storm water periods. That is my opinion as often expressed in previous letters to Government. I consider that a backwater opening into any harbour in cyclonic latitudes would be fatal to its efficiency, and the work of years be destroyed in one day, when a tempest made its appearance. Mr. Parkes says that Vizagapatam river is much smaller than Bimlipatam river, and therefore seems to infer that this influence would be weakened. But he saw it only in fine weather; the hilly neighbourhood round Vizagapatam prevents the expenditure of any storm water on the road to the sea as is done on the sandy plains through which Bimlipatam river runs, and the rush of water, the destruction of villages and crops, the inundation of lands and of the town of Vizagapatam alone, is a marked feature in cyclones, which always visit the ports simultaneously; hence my objection is not weakened. The site I would propose for harbours at Bimlipatam and Vizagapatam is the bay, which in both cases is formed immediately round the Dolphin's Nose in Vizagapatam and the round hill at Bimlipatam. Here deeper water can be obtained far nearer inshore and a railway could run into the harbour. In the case of Vizagapatam, however, a railway would have to cross the river before it could do this. I do not think that I have any more to add on this subject. My opinion, derived from many years' observations, has been long before Government. The question of a first-class harbour is a serious one, and the conditions demanded are capable of much discussion. Certainly Madras, if intended as an example of Mr. Parkes's methods at the North Ports, is not a specimen of one; it is merely a shelter during ordinary weather, and a great facility to trade. Madras should be well tested upon its merits when fully developed before more outlay is incurred on the coasts of this Presidency.

No. 1. 54C C.B

Note by Colonel R. H. SANKEY, R.E., Chief Engineer, Public Works Department, dated Ootacamund, 7th June 1882.

In compliance with the request made by the Government of India in Public Works letter No. 301 M., dated 12th September 1881, Mr. Parkes, after submission of his report on the restoration of the Madras Harbour Works, proceeded to examine the capabilities of the ports of Vizagapatam, Bimlipatam, and Calingapatam for the formation of harbours for vessels of large draft.

49-81

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

9th March 1882, No. 61~~2 A W.~~

~~Buildings and Roads.~~
~~Civil Works.~~

General Establishment

Read the following papers :—

~~No. 82-A.~~ From the Acting Resident of Travancore and Cochin, dated 18th January 1882, No. 8.

~~No. 82-B.~~ From the Government of India, dated 13th February 1882, No. 82 M.

~~No. 82-C.~~ ORDER ~~THEREON,~~ 9th March 1882, No. 612-A W, Public Works

MR. PARKES having now submitted to Government his report on the best method for reconstructing the Madras Harbour Works may consider himself at liberty to proceed by the next B.I.S.N. Steamer to Vizagapatam.

2. After examining the capabilities of that port, as also those of Bimlipatam and Calingapatam, for the formation of first-class Harbours, he should return to Madras and subsequently proceed by Beypore to Quilon with the same object.

3. On the completion of the special duty adverted to Mr. Parkes may return direct to England, if possible however submitting his reports on the several ports to this Government before his departure.

4. Should he be unable to do this he may draw up and forward the reports at an early date from England.

5. While engaged on this special duty Mr. Parkes's Indian pay at £160 will be in abeyance, but he will be entitled to a fee of £10-10-0 for each day while so specially engaged. Sundays may be included in the demand, and all *bona fide* travelling and hotel expenses will be met by Government, who will further, if desired, make the bills payable in England.

6. While engaged on the examination of the Quilon Harbour, Mr. Parkes's expenses will be defrayed by the Travancore Government. The charges will commence from the date on which Mr. Parkes leaves Madras for Quilon and end on date of embarkation for England at Colombo.

7. The following telegram has been despatched to the Collector and Agent at Vizagapatam :—

"Government desires that all needful aid be afforded Parkes who leaves by steamer to-day to report on the Vizagapatam and Calingapatam Harbours. Please warn Executive Engineer and Port Officer."

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

To W. Parkes, Esq., M. INST. C.E., with file of papers.
To the Resident at Travancore.
„ Examiner of Public Works Accounts.
„ Marine Department.
„ Agent to the Governor of Vizagapatam.
„ Political Department.

Exd. S. T. Austin.
Spare Copies

2. His report, dated the 5th April 1882, is now submitted for the consideration of Government, accompanied by remarks from the Master Attendant, Madras, letter No. 4039, dated 13th May 1882. Both officers are entirely agreed as to the impossibility of constructing harbours of the character specified for a sum which would hold out a hope of remunerative returns being obtained from the trade, even if it had expanded to ten times that now existing, and there would appear to be no reason to dispute this opinion, which coincides with that which I have always maintained.

3. Considering the very few days each year during which cargo boats find it impossible to communicate with vessels lying off any of the Eastern Coast ports, and the great facility with which steam vessels lade and at present discharge cargoes, it can scarcely be doubted that the time has not yet arrived for undertaking the construction of first-class harbours.

4. The question of constructing an Imperial Harbour at any point of the coast capable of affording shelter to the largest class of iron clad, not only in time of war, but during cyclones, is one with which the Supreme Government can alone deal, and, so far as concerns the enquiries now under reference, does not come under consideration.

5. Such being the general conclusions arrived at, it only remains to notice those points of Mr. Parkes's report bearing upon the practical action to be taken in view to the possibilities of the future.

6. 1st. Calingapatam Harbour.—Though in Mr. Parkes's opinion the river mouth is not available as a boat harbour, he nevertheless considers it possible, by constructing a breakwater along the reef of rocks to the south at a roughly approximate outlay of fifty lakhs, to afford shelter for shipping.

7. To allow of a decision being arrived at, a complete hydrographical survey of the roads is needed, chiefly with the object of deciding as to the transporting influence of the "long shore currents, &c." It is thought that arrangements should be made at an early date for a survey of this character.

8. 2nd. Bimlipatam.—Though here there is a reef of rocks to the south somewhat similar to that at Calingapatam, the general position is, in Mr. Parkes's opinion, less favorable for the construction of a first-class harbour, owing to the close proximity of the *debouchure* of the Chittavalsa river, which in flood brings down a large quantity of silt; but here again a complete hydrographical survey is recommended, and certainly appears necessary, before a safe decision can be arrived at in regard to the fixing of the mouth of the river, and improving, if possible, the depth of water on the bar for cargo boats.

9. 3rd. The Vizagapatam Harbour.—Though much more favorably impressed with Vizagapatam, where an outer harbour of the Dolphin's Nose (a revival of one of Sir Arthur Cotton's schemes, subsequently rejected) might, he thinks, be formed, Mr. Parkes observes that "thirty times the present trade might be carried on, and yet the arguments in favor of a first-class harbour would be only one-half as cogent as they were in the case of Madras eight years ago."

apparently

10. This opinion will probably be accepted as sufficiently conclusive for the present against the preparation of any harbour scheme; but Mr. Parkes proceeds to recommend also in this case the execution of a very careful and detailed hydrographic survey in the hopes of being able eventually to very greatly improve the depth of water in the bar, &c., and further to take action in reference to the scheme for reclaiming the backwater which has now for some years been in operation under concessions made to the Roman Catholic Mission.

11. As both these suggestions, though perfectly legitimate and even desirable in themselves, hold out hopes of improving the entrance to the backwater to an extent which I am convinced can never be realized excepting in very small degree, it appears desirable to offer certain observations thereon.

12. In paragraph 26 the opinion is expressed that with the information afforded by the survey as recommended, "a competent Engineer would be enabled, with something approaching absolute certainty, to state at what expense the entrance channel could be made to have a permanent position and increased depth." The actual depth

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of [1882] Madras.

PUBLIC WORKS.

To

W. PARKES, Esq., M. Inst. C.E.,
&c. &c. &c.

Dated March 9th

Issued

Recd. Encl.

G.O., 9th March 1882, No. 612-A W.

MARCH.
Nos. 82A–82C.

Mr. Parkes.—Passing orders regarding the deputation of — to visit and report on the Ports of Bimlipatam, Calingapatam and C...

No.

[illegible] 150

From
William Parkes, Esq.
Civil Engineer

To
The Secretary to Government,
Public Works Department,
Madras

Madras 5th April 1882.

Sir,

Having now made the inspection of the three ports of Vizagapatam, Bimlipatam and Calingapatam as instructed by the Government Order No. 612 A.W. dated 9th March 1882, I have the honor to report the results.

2. I should explain at the outset that my remarks will be necessarily of a very general character. With respect to the two latter places I was unable to obtain any charts or plans whatever more detailed than the

which might thus be secured on the bar is not stated, and if only such as "to allow of the use of larger cargo boats" (paragraph 22), this it may be thought would be attainable; but from the observations in the previous paragraph, where it is said that "if an inland dock (no doubt for first-class vessels) is preferred with a deep water approach, such a scheme would be perfectly practicable." Mr. Parkes must have thus had clearly in view the possible permanent deepening of the water on the bar to at least 21 feet at low water. Large vessels could thus at high water just scrape in without bumping if there were no surf—a state of matters by the way which can be counted on for very few days in the year. I thus have assumed quite the minimum workable depth ~~to~~ apparently ~~the~~ aimed at under Mr. Parkes's suggestion.

9" pica

13. During the last season the minimum depth of water on the Vizagapatam bar has been only 2 feet 3 inches, and although during excessive flood the depth has been known to be momentarily scoured out to a full depth of 15 feet 5 inches, this has never been maintained, and indeed has always, it is understood, decreased rapidly on the cessation of the exceptional cause.

14. There are in fact two very distinct reasons why a shallow bar must, it is feared, be always the rule—*first*, the continued action of the surf; *second*, the weak tidal scour owing to the very small difference of level between high and low water, even during springtides.

15. As regards the first point, Mr. Robertson, who, as professional Harbour Engineer, was deputed by the Secretary of State, in 1871, to examine the ports of the Madras Presidency, observed in reporting on Cochin (where the surf is necessarily much milder than at Vizagapatam) that "the surf is always striving to restore the natural profile of conservancy of the shore. After the current has flowed out to sea for nearly a mile, it is no longer able to resist and keep down the ever-working and powerful efforts of the waves, to reform the profile of the coast, by continuing the beach line which has broken through the outgoing current."

16. Apparently all professional Harbour Engineers agree in this statement, but the following observations by Mr. D. Stevenson seem so apposite as to excuse further quotation. This authority observes that the waves throw up "a girdle of light or heavy material * * * round every bay and headland of our (English) coast, and the entrances to rivers form no exception. The effects of this constant action of the sea is to form a continuous line of beach across the mouths of our tidal rivers and inlets." He apparently attaches little importance to river currents as agents in the production or regulation of bars, observing that "a bar would be formed although the outgoing current held not one particle of matter in suspension."

17. To show how completely the ever-working surf, particularly along the East Coast of the Peninsula, is the main cause of all bars at river mouths, and what very slight or permanent influence is exercised by either the extent of the backwaters, and tidal flow through the open mouths, or by the volume of water discharged by the feeding rivers, I have here collected a few facts in the annexed Table A connected with the chief of our South Indian ports, which, though admittedly incomplete, will at least serve to demonstrate the truth of this position.

18. First it will be noted that the great tidal estuary at Pulicat, with 178 square miles of area, though on occasion of excessive flood able to deepen the water on the bar at its only open mouth to 15 feet, can maintain a minimum depth of no more than 3 feet, and often not even that, for the mouth closed entirely in 1879, and has done so again this year.

19. The next great tidal estuary is that of Cochin on the West Coast. Here the area of the backwater is about 32 square miles (*i.e.*, excluding the enormous backwater with which it is connected to the south and which if added would give a total of 90 square miles), and the conditions under which the mouth is kept open are very much more favorable than at Pulicat. Not only is the surf of a very much milder character, but the bottom is to a great extent mud, a material much less easily acted on by the waves than fine sand. Yet here with almost unrivalled advantages the minimum depth on the bar is only 11 feet and the maximum 14 feet. To shelter this bar and thus, by preventing the action of the surf, to give the tidal action full and free play, Mr. Parkes himself not long since estimated the cost at eighty lakhs.

the Trigonometrical survey to a scale of 4 miles to an inch and a navigating chart on which the 67 miles between the two extreme ports is shewn on three inches of paper. The local authorities were not in possession of the more detailed coast charts issued by the Marine Survey Department, which however I had an opportunity of inspecting on board the steamer which conveyed me up the coast.—

3. In respect of Vizagapatam I was furnished with a voluminous file of papers and several plans (herewith returned).— These contain much valuable information but are by no means complete for the special purpose of my inspection.—

4. Some of my conclusions

therefore

therefore are necessarily subject to revision by the results of more complete information, but I will take care to indicate where they are subject to reserve on this account.—

5. I would also beg to call attention to the rather large disproportion between the terms of my instructions, (the capabilities of the ports for the formation of first class harbours) and the circumstances of the ports themselves. I need hardly say that the present trade of the ports offers no prospect of the expenditure on first class harbour works being productive, but to give an idea of the magnitude of the discrepancy, I may say that if the present trade of Vizagapatam and Bimlipatam were combined, and the trade of the joint port multiplied

ten

20. The only bar along almost the whole East Coast which preserves any moderate depth is that of the Kundaleru river near Krishnapatam. Here, though the catchment area of the feeding river and also of the tidal estuary are both of moderate dimensions (though greatly in excess of Vizagapatam), there is generally a minimum depth of about 8 feet of water on the bar. There can be no doubt that this is the result of two peculiarities.

The river mouth is placed to the north of the great ~~Armegun~~ Armogham Shoal, and is thus shielded in a very exceptional manner from the effects of the surf brought up by the south-west monsoon. The bottom is also composed of mud. But even with all these advantages, and with a deep river channel to which the stream is confined, a catchment area and flood discharge nine times that at Vizagapatam, &c., only 8 feet of water can be counted on for the use of vessels.

21. Even were the whole area of the Vizagapatam Estuary, now in process of reclamation by the Catholic Mission (viz., 2·75 square miles), added to the portion still untouched (0·66 square miles), the total area thus available would only be 3·4 square miles, which is a mere trifle compared with others all along both coasts. The fact is, the action of the surf cannot be got rid of without unduly costly sheltering works, and unless these be undertaken, it is, to the best of my judgment, useless to expect anything more than a ~~possible~~ slight improvement of the depth of water on the bar.

22. The second cause of shallow bars along our coasts is the small rise and fall of the tide. To those accustomed to the tidal range usually met with in England (*e.g.*, 26 feet at Liverpool, 16 feet at Holyhead, 37 feet at Weston-super-Mare, &c., and even some 20 feet at Calcutta, 15 feet at Bombay, and 12 feet in the Gulf of Cutch) sufficient account is not likely to be taken of the comparatively trifling rise and fall with which we have to deal so far north on the coast of the Peninsula as the latitude of Vizagapatam. Here the maximum difference at springtides in 1881 was, as shown by Captain Baird's tables, only 5 feet 9 inches; and it may be assumed that having, as a rule, to work with a very much less height of tide than this, the velocities producible over the bar must be comparatively feeble, no matter what the arrangements adopted for conserving and utilizing the tide water in its passage to and from the backwater.

23. In my previous report on the Vizagapatam Harbour printed with G.O., 13th August 1880, No. 1939 W., I pointed out (paragraphs 52 and 53) the value which might attend giving up the reclamations, though there were some counterbalancing facts to be considered.

24. The enquiries then started have not been completed, owing to the hands of the Executive Engineer being too full with other work, but there no is reason why an effort should not now be made either by placing the surveys contemplated by Mr. Parkes under charge of the A. Project Division (now working in Ganjam) or through specially appointed agency.

tenfold, the saving in the landing and shipping charges (which I believe to be the only proper source of harbour revenue) would scarcely pay interest on the sum required for providing sheltered berths for the ships frequenting the port

6. With such a very remote prospect therefore of the question becoming a practical one, I think it better to abstain from giving any thing like designs for the possible harbours of the future but merely indicate the points in which I think one or the other locality has a prima facie superiority.–

7. As shewn by an outline map of the coast, the three ports have a certain similarity. Each has the same aspect, about South East, each is situated in a shallow indentation or bight of the coast, formed by a

projecting

projecting point of land to the Southward, each has a river discharging in its immediate neighbourhood. I may add that they are alike very favorably situated for the masulah boat system of communication. The cost of landing and shipping is less than in the Madras roads, interruptions from bad weather are much less frequent, as are also complaints of damage to the cargo. The cost at Madras from the roads is Rs 1. $\overset{a}{4}$ per ton, at Vizagapatam and Bimlipatam it is 10 annas, and at Calingapatam $\overset{a}{10}$. $\overset{p}{8}$ for half the year, and one rupee for the other half. The burst of the N.E. monsoon is less violent on this part of the coast than at Madras, and heavy seas from the Northward

are

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TABLE A.

Ports or Tidal Estuary having a connection generally open with the sea.	Littoral District.	Area of Tidal Estuary.	Catchment Area of the feeding rivers.	Maximum flood discharge of ditto.	Depths of Water on the Bars at the open mouths. Maximum.	Depths of Water on the Bars at the open mouths. Minimum.	Difference between High and Low Water. Spring-tides.	Difference between High and Low Water. Neap-tides.
1	2	3	4	5	6	7	8	9
EAST COAST.		SQ. MILES.	SQ. MILES.	C. FEET PER SECOND.	FT. IN.	FT. IN.	FT. IN.	FT. IN.
Vizagapatam ..	Vizagapatam ..	(a) 0·66	135	?	15 5	2 3	(b) 5 9	(b) 1 2
Godávari river mouth—								
Yanam ..	Godávari ..	?	112,200	1,350,000	8 6	3 0	5 6	1 2
Narsápur ..					17 0	?		
Bendamur Lanka					?	?		
Kundaleru	Nellore ..	16	1,198	64,687	?	8 0	..	..
Pulicat Lake ..	..	178	2,057	92,817	15 0	3 0	..	..
Ennore Backwater ..	Chingleput ..	6	962	54,562	10 0	3 0	..	..
Covelong do. ..	..	14	279	24,187	6 0	3 0	..	..
WEST COAST.								
Cochin Backwater ..	Cochin ..	(c) 32	2,700	?	14 0	11 0	..	..
Beypore do. ..	Malabar ..	6	1,050	?	12 0	6 0	(b) 3 6	(b) 1 0
Mangalore do. ..	South Canara ..	10	1,830	?	?	6 0	..	..

REMARKS.

(a) Area under reclamation is 2·75 square miles, so total area of the backwater would, if free, be 3·4 square miles.

(b) Taken from Captain Baird's Tide Tables for 1881, generally speaking, the height of the tides decreases gradually to the south of the Bay of Bengal, the maximum height of springs at Madras being only 4 feet, and of neaps 10 inches. At Pámban there is at times no sensible difference of level at neap-tides. The same rule holds good for the West Coast ports; those situated to the south having very low tides, while at Bombay the difference is as much as 15 feet between high and low water springs.

(c) To this area must also be added that of the Allepey backwater (58 square miles with 2,000 square miles of catchment), which vents itself ultimately at Cochin, thus making the total area whose drainage passes over the bar at the latter place = 90 square miles of backwater and 4,700 square miles of upper catchment.

No. 55

ORDER—dated 8th July ~~June~~ 1882, No. 1718 W, Public Works.

Forwarded to the Government of India in reply to their letter, No. 82 M., dated 13th February 1882, with the observation that this Government considers it unnecessary to consider any schemes at present for the construction of harbours suitable for vessels of large draft at either Vizagapatam, Bimlipatam, or Calingapatam.

2. The Chief Engineer will report what arrangements can be made for giving effect to Mr. Parkes's suggestions for the execution of careful and detailed hydrographic surveys of the three ports mentioned.

(Here enter No. , dated June 1882.)

(True Extract.)

Colonel R.E.

~~Under~~ Secy. to Govt., P.W.D.,
~~Irrigation Branch~~.

To the Superintending Engineer, First Circle.
„ Chief Engineer, Public Works Department.
„ Marine Department.

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56 No.

ENDORSEMENT—dated 8 July ~~June~~ 1882, No. 1719 W, Public Works.

Copy of the above forwarded to the Government of India.

Colonel R.E.

~~Under~~ Secy. to Govt., P.W.D.,
~~Irrigation Branch~~.

Exd. A. F. Goodall.

28/2

are unknown. Cyclones are said to be more rare than they are either to the Northward or Southward. In a word, the three ports were represented to me by the local authorities and apparently with truth, as being singularly well situated for carrying on a much increased trade upon the present system, and practically without interruption at all seasons of the year.—

8. The above description applies to all three ports. I have now to describe the peculiarities of each in reference to its capabilities for the formation of a first class harbour. It will be convenient to begin with Calingapatam.

Calingapatam.—

9. The projection which forms the bay in this case is a low promontory, terminating in two reefs of rock which

run

run out some distance into the sea.— The landing place is about two miles North of this, and a mile further is the mouth of the river. No use is made of the latter as a boat harbour, the boats being hauled up on the beach. They are smaller than those of Madras, carrying only 1½ instead of 2 tons. Ships anchor a little over ½ a mile from shore in 5 fathoms at low water. The tonnage of exports and imports was as follows:—

	Exports	Imports	Total
1880–1	24,000	323	24,323
1881–2	12,253	203	12,456

The trade of 1880-1 was swelled by the large shipments of rice. The demand for this occurs at intervals averaging about 5 years.—

10. With respect to the capabilities of this port for a first class harbour it is impossible with my present

information

8TH JULY 1882, No. 1719 W., PUBLIC WORKS.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
~~Military~~ Civil Works.

No. 54.

READ—again the following G.O., dated 9th March 1882, No. $\frac{612}{A}$ W., Public Works.

Read—the following papers:—

From the Acting Resident of Travancore and Cochin, dated 18th January 1882, No. 8.
From the Government of India, dated 13th February 1882, No. 82 M.

Order—dated 9th March 1882, No. $\frac{612}{A}$ W., Public Works.

Mr. Parkes having now submitted to Government his report on the best method for reconstructing the Madras Harbour Works, may consider himself at liberty to proceed by the next B.I.S.N. Steamer to Vizagapatam.

2. After examining the capabilities of that port, as also those of Bimlipatam and Calingapatam, for the formation of first-class harbours, he should return to Madras and subsequently proceed by Beypore to Quilon with the same object.

3. On the completion of the special duty adverted to Mr. Parkes may return direct to England, if possible, however, submitting his reports on the several ports to this Government before his departure.

4. Should he be unable to do this, he may draw up and forward the reports at an early date from England.

5. While engaged on this special duty Mr. Parkes's Indian pay at £160 will be in abeyance, but he will be entitled to a fee of £10-10-0 for each day while so specially engaged. Sundays may be included in the demand, and all *bonâ fide* travelling and hotel expenses will be met by Government, who will further, if desired, make the bills payable in England.

6. While engaged on the examination of the Quilon Harbour, Mr. Parkes's expenses will be defrayed by the Travancore Government. The charges will commence from the date on which Mr. Parkes leaves Madras for Quilon and end on date of embarkation for England at Colombo.

7. The following telegram has been despatched to the Collector and Agent at Vizagapatam:—

> "Government desires that all needful aid be afforded Parkes, who leaves by steamer to-day to report on the Vizagapatam and Calingapatam Harbours. Please warn Executive Engineer and Port Officer."

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Government, P.W.D.

information to form more than the negative conclusion that I can see no reason why it should not be formed at the Southern end of the Bay utilizing the reef of rocks as far as it goes to seaward for the foundation of a breakwater, which would then be turned Northward and continued along the 6 fathom line parallel to the shore for a sufficient distance, say a mile, at a cost approximately of 50 lacs. There is good stone at Garrali Hill 4 miles distant.—

11. This conclusion however should be subject to reconsideration by the help of a complete hydrographical survey of the locality, and especially in reference to the correctness of my present impression that the offing currents and the transporting influence of the

alongshore

alongshore wave are sufficiently preponderating from the Southward to prevent any conveyance of the solid matter brought down by the river floods towards the harbour. It is against Calingapatam that the River mouth is not available as a boat harbour.—

Bimlipatam

12. In this case the projecting point of land at the South end of the bight also terminates in a reef of rocks running out to sea, but it differs from Calingapatam in the fact that the river discharge is quite close to the point, in fact impinges upon it during times of flood. The river mouth is used as a boat-harbour whenever practicable, the masulah boats (which are rather longer than those of Madras,

carrying

sea. The landing place is about two miles north of this, and a mile further is the mouth of the river. No use is made of the latter as a boat harbour, the boats being hauled up on the beach. They are smaller than those of Madras, carrying only 1½ instead of 2 tons. Ships anchor a little over half a mile from shore in 5 fathoms at low water. The tonnage of exports and imports was as follows:—

	Exports.	Imports.	Total.
1880-81	24,000	323	24,323
1881-82	12,253	203	12,456

The trade of 1880-81 was swelled by the large shipments of rice. The demand for this occurs at intervals averaging about five years.

10. With respect to the capabilities of this port for a first-class harbour, it is impossible, with my present information, to form more than the negative conclusion that I can see no reason why it should not be formed at the southern end of the bay, utilizing the reef of rocks as far as it goes to seaward for the foundation of a breakwater, which would then be turned northward and continued along the 6 fathom line parallel to the shore for a sufficient distance, say a mile, at a cost approximately of 50 lakhs. There is good stone at Garrah Hill, 4 miles distant.

11. This conclusion, however, should be subject to reconsideration by the help of a complete hydrographical survey of the locality, and especially in reference to the correctness of my present impression that the offing currents and the transporting influence of the alongshore wave are sufficiently preponderating from the southward to prevent any conveyance of the solid matter brought down by the river floods towards the harbour. It is against Calingapatam that the river mouth is not available as a boat harbour.

12. BIMLIPATAM.—In this case the projecting point of land at the south end of the bight also terminates in a reef of rocks running out to sea, but it differs from Calingapatam in the fact that the river discharge is quite close to the point, in fact impinges upon it during times of flood. The river mouth is used as a boat harbour whenever practicable. the Masulah boats (which are rather longer than those of Madras, carrying 2½ tons) loading on the sheltered beach within. At times, however, this is closed in consequence of the shallow water on the bar, and then they load and discharge on the exposed sea beach. The anchorage is about the same distance from shore as at Calingapatam and at the same depth, viz., a little over half a mile for 5 fathoms. The tonnage in 1880-81 was exports 17,946, imports 3,401; total 21,347.

13. With respect to the capabilities of Bimlipatam for a first-class harbour, I think there is a very strong *prima facie* objection in the existence of the river mouth so close to the site of the harbour. The river is insignificant at ordinary times, but in floods it fills the eleven arches of a bridge, each 30 feet span and 15 feet high, with a torrent of silt-laden water. The solid matter thus carried to the sea is dispersed by the waves and currents over a large area, so that its effects are imperceptible upon the coast; but if those dispersing forces were interfered with, which it is the very object of a harbour to do, the movement of the solid matter would be arrested, and it would remain as an accumulation possibly extensive enough to neutralize in a couple of days the effects of several years' work. I think, therefore, that the bight of Bimlipatam should be avoided as a site for first-class harbour works.

14. I would, however, beg to recommend that a series of systematic surveys be made of the Bimlipatam coast and backwater—first, because I believe they would lead to results of considerable importance to hydrographic science, and, second, because I think they would indicate some practicable means of lessening the evil, to which the port is now liable, of the constantly shifting bar.

15. I cannot do more with the data now before me than indicate the general direction in which such improvement seems to be possible. The river takes a southerly course for about a mile before falling into the sea, and when in flood impinges upon the northern side of the low promontory which forms the southern extremity of the bight, and then opens a channel through the sand close to the rocky reef which projects from the promontory. The channel so formed has been known to have a depth of upwards of 16 feet at low water. The tendency of the prevailing northerly drift of

carrying 2½ tons) loading on the sheltered beach within. At times however this is closed in consequence of the shallow water on the bar, and then they load and discharge on the exposed sea beach. The anchorage is at about the same distance from shore as at Calingapatam and at the same depth, viz a little over ½ a mile for 5 fathoms: The tonnage in 1880-1 was Exports 17.946, Imports 3401. Total 21.347.—

13. With respect to the capabilities of Bimlipatam for a first class harbour I think there is a very strong prima facie objection in the existence of the River mouth so close to the site of the harbour. The river is insignificant at ordinary times, but in floods it fills the 11 arches of a bridge each 30 feet span and 15 feet high

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sand, however, is to force the channel northward, and at the same time to shallow it, as the floods slacken. In this way the channel, as it is forced to the northward, is only kept open by the scour of the tidal water flowing in and out until it reaches a permanent sand hill at about 800 feet distance. There it remains till a new land fresh re-opens the southern site again and closes the northern one. There is therefore a continual oscillation of the channel between these two extremes, and at times it is so shallow and the surf so high across it that boats cannot enter or leave it.

16. I think it quite possible that this northerly drift of sand by sea action might be found preventible by an inexpensive groyne of rough stone to the southward of the flood-made channel, but the proposal should be reconsidered in view of, at least, two complete surveys, one immediately after the periodical floods in October and the other in April, after the northerly sea-drift has been for some time in action.

17. A screw pile pier has been suggested, but I fear the cost of this, if carried out sufficiently beyond the shifting shore line to have permanent deep water alongside, would be more than the trade of the port would warrant. The possibility of a permanent access to a constantly smooth backwater should, I think, be at any rate first considered.

18. Vizagapatam.—Here the projecting point which forms the bight is a bold headland 500 to 600 feet high, with precipitous slopes on the north and east. It consists of a gneiss rock of variable quality, much of which is disintegrating under the action of the air and sea, and masses have fallen down and form a rocky foreshore for some distance into the sea. The mouth of the river is close to the northern face of the point, and is fixed in that position by a detached hill (Ross's Hill) on the opposite shore, the channel lying between the two. To the northward the shore is a sandy beach on which the town of Vizagapatam is built. The anchorage is half a mile from the beach in a depth of 5 to 6 fathoms. Masulah boats carrying 2½ tons convey the goods to and from the river mouth, within which they always load and discharge. When they cannot cross the bar, which very rarely happens (fifteen such occasions occurred in the last two years), the port is considered closed. The tonnage of 1880-81 was exports 9,495, imports 1,745; total 11,240.

19. The Vizagapatam river is much smaller than that of Bimlipatam, having only one-fourth the area of catchment basin, and of course only a proportionate intensity of floods. On the other hand, the tidal backwater is much larger, and consequently the tidal scour more powerful. The interior of the backwater is much used for docking native vessels.

20. On the whole I consider the natural advantages of Vizagapatam for harbour accommodation of whatever class, whether shelter for Masulah boats, or shelter for first-class steamers be required, to be superior to those of either Calingapatam or Bimlipatam, and I think the port is well adapted for developing an increasing trade. The advantages are—

1st.—The deeper water near shore, by which the extent of the sea works necessary for a first-class harbour will be diminished.
2nd.—The large tidal backwater by means of which channels at once navigable for boats, and which by proper means may be gradually made navigable for larger vessels and even ultimately for first-class ships, far in the distant future as this may now appear.
3rd.—The more moderate and manageable volume of the land floods.
4th.—The more favorable position of the river mouth with reference to the effects of flood discharges on possible future works.
5th.—The abundance of material for works of construction.

21. If Vizagapatam ever becomes a place of great trade, the facilities for carrying on that trade will be added step by step, and by the time great works for sheltering ships are required, the conditions of the case will be very different from the present. I think, therefore, that any designs based upon our present knowledge would be only purposeless speculation. Let it be borne in mind that with ships anchored in the roads as at present, thirty times the present trade might be carried on, and yet the arguments in favor of a first-class harbour would be only one-half as cogent as they were in the case of Madras eight years ago. I can only now say that if in that

distant future a harbour outside the Dolphin's Nose is required, it can be made. If, on the other hand, an inland dock is preferred with a deep water approach, such a scheme would be perfectly practicable, but my insight into futurity will not permit me to speculate on the scale of the works or on their cost.

22. A far more practical question is how to facilitate the operations of trade in the earlier steps of its anticipated development. The means must be sought in the removal of the existing impediments to the free passage of Masulah boats in and out of the mouth of the backwater, and in the subsequent further enlargement of the latter, so as to allow of the use of larger cargo boats.

23. Small as this object is compared with the construction of a first-class harbour, it is one which requires for its design a far more elaborate preliminary investigation. The object is, of course, the permanent lowering of the bar, which lies a little outside the narrowest part of the entrance. The difficulty of the question is shown by the number of theories which have been put forward to account for the existence of the bar, and the still greater number of remedies which have been proposed for the evil. There is only one feature which is common to all these theories and proposals, viz., that they are based on insufficient data. If these were furnished, as they may easily be, I believe the true remedy would become apparent, and though it might not be within the immediate resources of the port to carry it out, it would be a satisfaction to know that the object is attainable in the near future.

24. I would therefore beg to conclude my remarks on Vizagapatam with two recommendations of a practical character, although they have more immediate reference to the earlier steps of harbour improvement than to the more distant object of first-class harbour accommodation.

25. My first recommendation is that a complete hydrographic survey of the harbour and roadstead be made to a scale of, say, 4 inches to the nautical mile, or 1,500 feet to an inch. This should include the whole of the backwater, showing distinctly the contours of ordinary and extraordinary high-water mark, and, where possible, the limits and levels of land floods; also the general levels of the overflowed marshes within the backwater. In addition to this (and this is with the view of furnishing the data which appear now to be wanting) a survey to a larger scale, say 150 feet to an inch, of the immediate entrance, that is, of the channel from the western ferry outwards continued to the 4 fathom contour seawards, and bounded on the north by a line drawn east from the Ice House, and on the south by a line drawn east from Mr. McMurray's Bungalow on the Dolphin's Nose. This survey should be repeated four times in the year, say in February, May, August, and November. By these surveys the changes in the form of the bar and entrance channels due to seasonal influences would be seen. Observations on the velocity and courses of the tidal currents, especially on the ebb, should also be made. A float sunk as deep as it can be to pass over the bar should be started at each successive hour of the ebb of an ordinary springtide, and its exact position at every 5 minutes noted. Similar observations of a floodtide would also be desirable, but the Surveyor would have to use his own judgment as to where the floats should be started so as to get into the harbour.

26. With the information afforded by those surveys and observations, I have no doubt a competent Engineer would be enabled, with something approaching absolute certainty, to state to what extent and at what expense the entrance channel could be made to have a permanent position and increased depth.

27. My second recommendation is that some final and definite arrangement be made regarding the right of reclamation of marsh land in the tidal backwater, and that the arrangement be based upon the principle that the flow and ebb of the tide is essentially the property of the Port authorities, and ought not, without special evidence that the interests of trade and navigation will not be thereby damaged, to be alienated for any other purpose whatever. This is a fixed principle of Port Conservancy, and one which should be most jealously guarded. No doubt there are many exceptions, cases in which the enforcement of the rule would be absurd. Bombay may be taken as an instance, but the rule has none the less a presumptive force, and the exceptions must be individually proved on special local grounds. I do not think Vizagapatam is

I believe they would lead to results of considerable importance to hydrographic science, and second because I think they would indicate some practicable means of lessening the evil, to which the port is now liable, of the constantly shifting bar.–

15. I cannot do more with the data now before me than indicate the general direction in which such improvement seems to be possible. The river takes a southerly course for about a mile before falling into the sea, and when in flood impinges upon the Northern side of the low promontory which forms the southern extremity of the bight, and then opens a channel through the sand close to the rocky reef which projects from the promontory.– The channel so formed

has

has been known to have a depth of upwards of 16 feet at Low water. The tendency of the prevailing Northerly drift of sand however is to force the channel northward and at the same time to shallow it, as the floods slacken. In this way the channel as it is forced to the Northward, is only kept open by the scour of the tidal water flowing in and out, until it reaches a permanent sand hill at about 800 feet distance. There it remains till a new land fresh reopens the southern site again and closes the Northern one. There is therefore a continual oscillation of the channel between these two extremes, and at times it is so shallow and the surf so high across it, that boats cannot enter or leave it.–

16. I think it quite possible that this Northerly drift of sand by sea

action

an exception. Every square foot of capacity of the tidal channels is required for navigation, and every one of the marsh that is cut off from the tidal overflow is so much loss to the channels.

28. The original concession to the Roman Catholic Mission appears to have been made in ignorance of this principle, and when, at a subsequent stage, the principle was asserted, it was treated rather as a matter of debatable theory than as the assertion of an acknowledged right. I think the Government should now take their stand upon this latter ground, and claim the rights to the tidal backwater as a whole on behalf of trade and navigation. With my present knowledge I should hardly be justified in suggesting a limit to the practical application of this claim, but I confess to a strong feeling that where the enclosed areas have not been brought under actual cultivation, it would be worth while to demolish the embankments and restore the tidal overflow. At any rate, a continuance of the system of reclamation by embankment will undoubtedly lead to the obliteration of Vizagapatam as a second-class port.

29. It must not be supposed that the loss of tidal water can be compensated for by any utilization of the land floods. As a rule—subject no doubt to many exceptions—tide water is beneficial and river water is injurious to the entrance of a harbour. The river water brings constant accessions of solid matter which must form a cumulative deposit somewhere. Tide water has no such tendency when once the channels are fully opened out.

30. But while I most strongly deprecate reclamation by embankment, there is another kind of reclamation which I think might be carried out with profit to the reclaimer and advantage to the harbour. This is to raise the whole area of a portion already near the level of high water by means of material dug from the marsh itself at a level between high and low water marks. This of course is more expensive than embanking, and might not be remunerative for mere agricultural purposes, but the land gained would be more immediately productive, and if the town should require extension towards the backwater, valuable building sites might be thus obtained. It should be a condition that the excavations be in continuous trenches, which would favor the flow of tide along them, and not in detached pits. I may mention that this system of reclamation has been carried out to a considerable extent at Kurrachee by private enterprise and with profitable results.

31. I would beg in conclusion to express my acknowledgment of the assistance and information furnished to me by the Port Officers at the several ports, Captain Jarvis, Captain Minto, and Captain Farley; also by Mr. Nordmann, C.E., who had given much attention to the harbour of Vizagapatam nine years ago, and made an excellent survey of a portion of it. To gentlemen connected with the mercantile firms of the three places I am also indebted for much information and kind hospitality.

No. 5 E.

Referred to the Master Attendant, Administrative Department, Madras, for remarks.

12th April 1882.
(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Government, P.W.D.

No. 54-B.

From J. H. TAYLOR, Esq., Lieut., R.N.R., Master Attendant, Administrative Department, to the Secretary to Government, Public Works Department, dated Madras, 13th May 1882, No. 4039.

In returning Mr. Parkes' memorandum on the ports of Vizagapatam, Bimlipatam, and Calingapatam, I have the honor to remark that that gentleman has very correctly demonstrated the inability of the trade of these ports, either singly or combined, to furnish any return worth speaking of for the outlay that would be required for a first-class harbour. Mr. Parkes justly observes that the returns from trade might be multiplied tenfold and yet not justify the expense. For convenience of shipping and discharging cargo, Bimlipatam has at present a great advantage over the others. It is very rarely that business is interrupted by weather, whereas Vizagapatam and Calingapatam are both dangerous and inconvenient, one from the nature of its bar, the other from that of its beach. The trade of Vizagapatam and Bimlipatam might be amalgamated, but no railway having its termination at either of these ports, and penetrating in a direct line to Raipore, would in my opinion much affect the trade of Calingapatam and Gopálpur, both of which are very large and improving ports. It is the peculiarity of the East Coast of this Presidency that, no matter from what district a full crop of food-grain, oil, gram, indigo or other produce issues, there is invariably a fairly convenient port ready for its shipment. What more can be desired? Mr. Parkes points out that careful survey should precede any official opinion about a harbour, and full understanding arrived at regarding the currents, sand movements, &c. That is an obvious truth. He seems to consider that the mouth of the Bimlipatam river, if it opened into a harbour, would be very injurious to its use during heavy freshes and storm water periods. That is my opinion as often expressed in previous letters to Government. I consider that a backwater opening into any harbour in cyclonic latitudes would be fatal to its efficiency, and the work of years be destroyed in one day, when a tempest made its appearance. Mr. Parkes says that Vizagapatam river is much smaller than Bimlipatam river, and therefore seems to infer that this influence would be weakened. But he saw it only in fine weather; the hilly neighbourhood round Vizagapatam prevents the expenditure of any storm water on the road to the sea as is done on the sandy plains through which Bimlipatam river runs, and the rush of water, the destruction of villages and crops, the inundation of lands and of the town of Vizagapatam alone, is a marked feature in cyclones, which always visit the ports simultaneously; hence my objection is not weakened. The site I would propose for harbours at Bimlipatam and Vizagapatam is the bay, which in both cases is formed immediately round the Dolphin's Nose in Vizagapatam and the round hill at Bimlipatam. Here deeper water can be obtained far nearer inshore and a railway could run into the harbour. In the case of Vizagapatam, however, a railway would have to cross the river before it could do this. I do not think that I have any more to add on this subject. My opinion, derived from many years' observations, has been long before Government. The question of a first-class harbour is a serious one, and the conditions demanded are capable of much discussion. Certainly Madras, if intended as an example of Mr. Parkes's methods at the North Ports, is not a specimen of one; it is merely a shelter during ordinary weather, and a great facility to trade. Madras should be well tested upon its merits when fully developed before more outlay is incurred on the coasts of this Presidency.

No. 54-C.

Note by Colonel R. H. SANKEY, C.B., R.E., Chief Engineer, Public Works Dement, dated Ootacamund, 7th June 1882.

In compliance with the request made by the Government of India in Public Works letter No. 301 M., dated 12th September 1881, Mr. Parkes, after submission of his report on the restoration of the Madras Harbour Works, proceeded to examine the capabilities of the ports of Vizagapatam, Bimlipatam, and Calingapatam for the formation of harbours for vessels of large draft.

2. His report, dated the 5th April 1882, is now submitted for the consideration of Government, accompanied by remarks from the Master Attendant, Madras, letter No. 4039, dated 13th May 1882. Both officers are entirely agreed as to the impossibility of constructing harbours of the character specified, for a sum which would hold out a hope of remunerative returns being obtained from the trade, even if it had expanded to ten times that now existing, and there would appear to be no reason to dispute this opinion, which coincides with that which I have always maintained.

3. Considering the very few days each year, during which cargo boats find it impossible to communicate with vessels lying off any of the Eastern Coast ports, and the great facility with which steam vessels lade and at present discharge cargoes, it

action might be found preventible by an inexpensive groyne of rough stone to the southward of the flood made channel, but the proposal should be reconsidered in view of at least two complete surveys one immediately after the periodical floods in October, and the other in April after the Northerly sea drift has been for some time in action.—

17. A screw pile pier has been suggested but I fear the cost of this if carried out sufficiently beyond the shifting shore line to have permanent deep water alongside would be more than the trade of the port would warrant. The possibility of a permanent access to a constantly smooth backwater should I think be at any rate first considered.

Vizagapatam

18. Here the projecting point which

forms

forms the bight is a bold headland 500 to 600 feet high, with precipitous slopes on the North and East. It consists of a gneiss rock of variable quality, much of which is disintegrating under the action of the air, and sea, and masses have fallen down and form a rocky foreshore for some distance into the sea. The mouth of the river is close to the Northern face of the point, and is fixed in that position by a detached Hill (Ross's Hill) on the opposite shore, the channel lying between the two. To the Northward the shore is a sandy beach on which the town of Vizagapatam is built. The anchorage is half a mile from the beach in a depth of 5 to 6 fathoms.— Masulah boats carrying 2½ tons convey the goods to and from the river mouth, within which they always load and discharge. When they cannot

cross

can scarcely be doubted that the time has not yet arrived for undertaking the construction of first-class harbours.

4. The question of constructing an Imperial Harbour at any point of the coast capable of affording shelter to the largest class of iron clad, not only in time of war, but during cyclones, is one with which the Supreme Government can alone deal, and, so far as concerns the enquiries now under reference, does not come under consideration.

5. Such being the general conclusions arrived at, it only remains to notice those points of Mr. Parkes's report, bearing upon the practical action to be taken in view to the possibilities of the future.

6. 1st. Calingapatam Harbour.—Though in Mr. Parkes's opinion the river mouth is not available as a boat harbour, he nevertheless considers it possible, by constructing a breakwater along the reef of rocks to the south, at a roughly approximate outlay of fifty lakhs, to afford shelter for shipping.

7. To allow of a decision being arrived at, a complete hydrographical survey of the roads is needed, chiefly with the object of deciding as to the transporting influence of the "long shore currents, &c." It is thought that arrangements should be made at an early date for a survey of this character.

8. 2nd. Bimlipatam.—Though here there is a reef of rocks to the south somewhat similar to that at Calingapatam, the general position is, in Mr. Parkes's opinion, less favorable for the construction of a first-class harbour, owing to the close proximity of the *debouchure* of the Chittavalsa river, which in flood brings down a large quantity of silt; but here again a complete hydrographical survey is recommended, and certainly appears necessary, before a safe decision can be arrived at in regard to the fixing of the mouth of the river, and improving, if possible, the depth of water on the bar for cargo boats.

9. 3rd. The Vizagapatam Harbour.—Though much more favorably impressed with Vizagapatam, where an outer harbour of the Dolphin's Nose (a revival of one of Sir Arthur Cotton's schemes, subsequently rejected) might, he thinks, be formed, Mr. Parkes observes that "thirty times the present trade might be carried on, and yet the arguments in favor of a first-class harbour would be only one-half as cogent as they were in the case of Madras eight years ago."

10. This opinion will probably be accepted as sufficiently conclusive for the present, against the preparation of any harbour scheme; but Mr. Parkes proceeds to recommend also in this case the execution of a very careful and detailed hydrographic survey apparently in the hopes of being able eventually to very greatly improve the depth of water in the bar, &c., and further to take action in reference to the scheme for reclaiming the backwater, which has now for some years been in operation under concessions made to the Roman Catholic Mission.

11. As both these suggestions, though perfectly legitimate and even desirable in themselves, hold out hopes of improving the entrance to the backwater, to an extent which I am convinced can never be realized, excepting in very small degree, it appears desirable to offer certain observations thereon.

12. In paragraph 26 the opinion is expressed that with the information afforded by the survey as recommended, "a competent Engineer would be enabled, with something approaching absolute certainty, to state at what expense the entrance channel could be made to have a permanent position and increased depth." The actual depth which might thus be secured on the bar is not stated, and if only such as "to allow of the use of larger cargo boats" (paragraph 22), this it may be thought would be attainable; but from the observations in the previous paragraph, where it is said that "if an inland dock (no doubt for first-class vessels) is preferred with a deep water approach, such a scheme would be perfectly practicable." Mr. Parkes must have thus had clearly in view the possible permanent deepening of the water on the bar to at least 21 feet at low water. Large vessels could thus at high water just scrape in without bumping if there were no surf—a state of matters by the way which can be counted on for very few days in the year. I thus have assumed quite the minimum workable depth apparently aimed at under Mr. Parkes's suggestion.

13. During the last season the minimum depth of water on the Vizagapatam bar has been only 2 feet 3 inches, and although during excessive flood the depth has been known to be momentarily scoured out to a full depth of 15 feet 5 inches, this has never been maintained, and indeed has always, it is understood, decreased rapidly on the cessation of the exceptional cause.

14. There are in fact two very distinct reasons why a shallow bar must, it is feared, be always the rule—*first*, the continued action of the surf; *second*, the weak tidal scour owing to the very small difference of level between high and low water, even during springtides.

15. As regards the first point, Mr. Robertson, who, as professional Harbour Engineer, was deputed by the Secretary of State, in 1871, to examine the ports of the Madras Presidency, observed in reporting on Cochin (where the surf is necessarily much milder than at Vizagapatam) that "the surf is always striving to restore the natural profile of conservancy of the shore. After the current has flowed out to sea for nearly a mile, it is no longer able to resist and keep down the ever-working and powerful efforts of the waves, to reform the profile of the coast, by continuing the beach line which has broken through the outgoing current."

16. Apparently all professional Harbour Engineers agree in this statement, but the following observations by Mr. D. Stevenson seem so apposite as to excuse further quotation. This authority observes that the waves throw up "a girdle of light or heavy material * * * round every bay and headland of our (English) coast, and the entrances to rivers form no exception. The effects of this constant action of the sea is to form a continuous line of beach across the mouths of our tidal rivers and inlets." He apparently attaches little importance to river currents as agents in the production or regulation of bars, observing that "a bar would be formed although the outgoing current held not one particle of matter in suspension."

17. To show how completely the ever-working surf, particularly along the East Coast of the Peninsula, is the main cause of all bars at river mouths, and what very slight or permanent influence is exercised by either the extent of the backwaters, and tidal flow through the open mouths, or by the volume of water discharged by the feeding rivers, I have here collected a few facts in the annexed Table A connected with the chief of our South Indian ports, which, though admittedly incomplete, will at least serve to demonstrate the truth of this position.

18. First it will be noted that the great tidal estuary at Pulicat, with 178 square miles of area, though on occasion of excessive flood able to deepen the water on the bar at its only open mouth to 15 feet, can maintain a minimum depth of no more than 3 feet—and often not even that, for the mouth closed entirely in 1879, and has done so again this year.

19. The next great tidal estuary is that of Cochin on the West Coast. Here the area of the backwater is about 32 square miles (*i.e.*, excluding the enormous backwater with which it is connected to the south and which if added would give a total of 90 square miles), and the conditions under which the mouth is kept open are very much more favorable than at Pulicat. Not only is the surf of a very much milder character, but the bottom is to a great extent mud, a material much less easily acted on by the waves than fine sand. Yet here with almost unrivalled advantages the minimum depth on the bar is only 11 feet and the maximum 14 feet. To shelter this bar and thus, by preventing the action of the surf, to give the tidal action full and free play, Mr. Parkes himself not long since estimated the cost at eighty lakhs.

20. The only bar along almost the whole East Coast which preserves any moderate depth is that of the Kundaleru river near Kistnapatam. Here, though the catchment area of the feeding river, and also of the tidal estuary are both of moderate dimensions (though greatly in excess of Vizagapatam), there is generally a minimum depth of about 8 feet of water on the bar. There can be no doubt that this is the result of two peculiarities. The river mouth is placed to the north of the great Armogham Shoal, and is thus shielded in a very exceptional manner from the effects of the surf brought up by the south-west monsoon. The bottom is also composed of mud. But even with all these advantages, and with a deep river channel to which

cross the bar which very rarely happens (15 such occasions occurred in the last two years) the port is considered closed. The tonnage of 1880-1 was Exports 9495, Imports 1745, Total 11240.

19. The Vizagapatam River is much smaller than that of Bimlipatam having only one fourth the area of catchment basin, and of course only a proportionate intensity of floods. On the other hand the tidal backwater is much larger, and consequently the tidal scour more powerful. The interior of the backwater is much used for docking native vessels.

20. On the whole I consider the natural advantages of Vizagapatam for harbour accommodation of whatever class, whether shelter for masulah boats, or shelter for first class steamers be required, to be superior

to

to those of either Calingapatam or Bimlipatam, and I think the port is well adapted for developing an increasing trade. The advantages are;

1st The deeper water near shore, by which the extent of the sea works necessary for a first class harbour will be diminished.

2nd The large tidal backwater by means of which channels at once navigable for boats, and which by proper means may be gradually made navigable for larger vessels and even ultimately for first class ships, far in the distant future as this may now appear.

3rd The more moderate and manageable volume of the land floods.

4th The more favorable position of the river mouth with reference to the effects of flood discharges on possible future works.

the stream is confined, a catchment area and flood discharge nine times that at Vizagapatam, &c., only 8 feet of water can be counted on for the use of vessels.

21. Even were the whole area of the Vizagapatam Estuary, now in process of reclamation by the Catholic Mission (viz., 2·75 square miles), added to the portion still untouched (0·66 square miles), the total area thus available would only be 3·4 square miles, which is a mere trifle compared with others all along both coasts. The fact is, the action of the surf cannot be got rid of without unduly costly sheltering works, and unless these be undertaken, it is, to the best of my judgment, useless to expect anything more than a slight improvement of the depth of water on the bar.

22. The second cause of shallow bars along our coasts is the small rise and fall of the tide. To those accustomed to the tidal range usually met with in England (*e.g.*, 26 feet at Liverpool, 16 feet at Holyhead, 37 feet at Weston-super-Mare, &c., and even some 20 feet at Calcutta, 15 feet at Bombay, and 12 feet in the Gulf of Cutch) sufficient account is not likely to be taken of the comparatively trifling rise and fall, with which we have to deal so far north on the coast of the Peninsula as the latitude of Vizagapatam. Here the maximum difference at springtides in 1881 was, as shown by Captain Baird's tables, only 5 feet 9 inches; and it may be assumed that having, as a rule, to work with a very much less height of tide than this, the velocities producible over the bar must be comparatively feeble, no matter what the arrangements adopted for conserving and utilizing the tide water in its passage to and from the backwater.

23. In my previous report on the Vizagapatam Harbour printed with G.O., 13th August 1880, No. 1939 W., I pointed out (paragraphs 52 and 53) the value which might attend giving up the reclamations, though there were some counterbalancing facts to be considered.

24. The enquiries then started have not been completed, owing to the hands of the Executive Engineer being too full with other work, but there no is reason why an effort should not now be made either by placing the surveys contemplated by Mr. Parkes under charge of the A. Project Division (now working in Ganjam) or through specially appointed agency.

TABLE A.

Ports or Tidal Estuary having a connection generally open with the sea.	Littoral District.	Area of Tidal Estuary.	Catchment Area of the feeding rivers.	Maximum flood discharge of ditto.	DEPTHS OF WATER ON THE BARS AT THE OPEN MOUTHS.		DIFFERENCE BETWEEN HIGH AND LOW WATER.	
					Maximum.	Minimum.	Spring-tides.	Neap-tides.
1	2	3	4	5	6	7	8	9
EAST COAST.		SQ. MILES.	SQ. MILES.	C. FEET PER SECOND.	FT. IN.	FT. IN.	FT. IN.	FT. IN.
Vizagapatam ..	Vizagapatam ..	(a) 0·66	135	?	15 5	2 3	(b) 5 9	(b) 1 2
Godávari river mouth—								
Yanam	Godávari ..	?	112,200	1,350,000	8 6	3 0	5 6	1 2
Narsápur					17 0	?		
Bendamur Lanka ..					?	?		
Kundaleru	Nellore ..	16	1,198	64,687	?	8 0	..	..
Pulicat Lake ..	..	178	2,057	92,817	15 0	3 0	..	..
Ennore Backwater ..	Chingleput ..	6	962	54,562	10 0	3 0	..	..
Covelong do. ..	..	14	278	24,187	6 0	2 0	..	..
WEST COAST.								
Cochin Backwater ..	Cochin ..	(c) 32	2,700	?	14 0	11 0	..	..
Beypore do. ..	Malabar ..	6	1,050	?	12 0	6 0	..	..
Mangalore do. ..	South Canara ..	10	1,830	?	?	6 0	(b) 3 6	(b) 1 0

REMARKS.

(a) Area under reclamation is 2·75 square miles, so total area of the backwater would, if free, be 3·4 square miles.

(b) Taken from Captain Baird's Tide Tables for 1881, generally speaking, the height of the tides decreases gradually to the south of the Bay of Bengal, the maximum height of springs at Madras being only 4 feet, and of neaps 10 inches. At Pámban there is at times no sensible difference of level at neap-tides. The same rule holds good for the West Coast ports; those situated to the south having very low tides, while at Bombay the difference is as much as 15 feet between high and low water springs.

(c) To this area must also be added that of the Allepey backwater (58 square miles with 2,000 square miles of catchment), which vents itself ultimately at Cochin, thus making the total area whose drainage passes over the bar at the latter place = 90 square miles of backwater and 4,700 square miles of upper catchment.

No. 55.

ORDER—dated 8th July 1882, No. 1718 W, Public Works.

Forwarded to the Government of India in reply to their letter, No. 82 M., dated 13th February 1882, with the observation that this Government considers it unnecessary to consider any schemes at present for the construction of harbours suitable for vessels of large draft at either Vizagapatam, Bimlipatam, or Calingapatam.

2. The Chief Engineer will report what arrangements can be made, for giving effect to Mr. Parkes's suggestions, for the execution of careful and detailed hydrographic surveys of the three ports mentioned.

(Here enter No. 1719 W., dated 8th July 1882.)

(True Extract.)

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Superintending Engineer, First Circle.
" Chief Engineer, Public Works Department.
" Marine Department.

No. 56.

ENDORSEMENT—dated 8th July 1882, No. 1719 W, Public Works.

Copy of the above forwarded to the Government of India.

(Signed) R. H. SANKEY, Colonel, R.E.,
Secretary to Govt., P.W.D.

Exd. A. F. Goodall.
Spare Copies

5th. The abundance of material for works of construction.–

21. – If Vizagapatam ever becomes a place of great trade the facilities for carrying on that trade will be added step by step, and by the time great works for sheltering ships are required the conditions of the case will be very different from the present. I think therefore that any designs based upon our present knowledge would be only purposeless speculation. Let it be borne in mind that with ships anchored in the roads as at present, 30 times the present trade might be carried on and yet the arguments in favour of a first class harbour would be only one half as cogent as they were in the case of Madras 8 years ago. I can only now say that if in that distant future a harbour outside the Dolphins Nose is

is required it can be made.– If on the other hand an inland dock is preferred with a deep water approach such a scheme would be perfectly practicable, but my insight into futurity will not permit me to speculate on the scale of the works or on their cost.

22. A far more practical question is how to facilitate the operations of trade in the earlier steps of its anticipated development. The means must be sought in the removal of the existing impediments to the free passage of masulah boats in and out of the mouth of the Backwater and in the subsequent further enlargement of the latter so as to allow of the use of larger cargo boats.–

23. – Small as this object is compared with the construction of a first class harbour, it is one which requires for its design a far more elaborate preliminary investigation.– The object is

BUILDINGS AND ROAD.
CIVIL WORKS.

Govt. of {1882} Madras.

PUBLIC WORKS.

Dated July, 8th.

Recd.

Encl.

G.O., 8th July 1882, No. 1719 W.

JULY.
Nos. 54–56.

Ports of Vizagapatam, Bimlipatam and Calingapatam.

CAPABILITIES of the — for the formation of 1st Class Harbours.—Mr. Parkes' report and other papers regarding the —, forwarded to the Government of India with certain observations.

18

Note on drainage areas and extent of tidal basin also depth of water on the bars of the Rivers at Mangalore Beypore & Cochin

The following drainage and tidal basin areas have been taken from the Trigonometrical survey map, (scale 4 miles 1 inch) they are of course only approximate and this is especially the case with regard to tidal basins.

The depth of water on the bars has been taken from Mr Robertson's Report.

With regard to flood discharges nothing is known and no attempt has been made to estimate them

Mangalore.

The approximate tidal basin area is 10 sq miles the catchment basin of the 2 rivers is

Gurpur river 365 sq miles
Netravatty do 1485 do
Total 1830 sq miles

is of course the permanent lowering of the Bar which lies a little outside the narrowest part of the entrance. The difficulty of the question is shewn by the number of theories which have been put forward to account for the existence of the Bar, and the still greater number of remedies which have been proposed for the evil. There is only one feature which is common to all these theories and proposals, viz that they are based on insufficient data. If these were furnished, as they may easily be, I believe the true remedy would become apparent, and though it might not be within the immediate resources of the port to carry it out, it would be a satisfaction to know that the object is attainable in the near future.—

24. I would therefore beg to conclude my remarks on Vizagapatam with two recommendations of a practical character, although they have

more

more immediate reference to the earlier steps of harbour improvement than to the more distant object of first class harbour accommodation.—

25. My first recommendation is that a complete hydrographic survey of the Harbour and Roadstead be made to a scale of say 4 inches to the nautical mile, or 1500 feet to an inch. This should include the whole of the Backwater shewing distinctly the contours of ordinary and extraordinary high water mark and where possible the limits and levels of land floods; Also the general levels of the overflowed marshes within the backwater. In addition to this (and this is with the view of furnishing the data which appear now to be wanting) a survey to a larger scale say 150 feet to an inch, of the immediate entrance that is of the

channel

The mouth is at present common to both rivers; in some years there were 2 mouths

The depth of water on the bar is 6 to 7 ft during the dry weather In the monsoon it is deeper but to what depth is scoured out is not known

The position of the mouth and bar varies for 3½ miles up and down the Coast

The sea beach is all sand and it is believed that no rock exists near the mouth.

Beypoor

Approximate area of tidal basin 6 sq miles

Catchment basin of river 1050 sq miles

The depth of water on the bar is 6 to 7 ft during the dry season In the monsoon the flood waters are said to scour it out to a depth of 12 ft

The position of the mouth and bar does not vary to any extent

On the South side there is a reef and isthmus that confines the current on the North side there is a sand bank.

It is not known to what distance and at what depth the reef extends from the South side across the river bar

Cochin

The Cochin backwater proper may be said to extend 17 miles North and 15 miles South of the mouth and have an approximate area of 32 square miles it is however connected with other backwaters at both the North and South ends

No large rivers enter the Cochin backwater proper and the area of the Catchment basin that drains into it is about 200 sq miles

Two very large rivers join the backwaters North and South of it the catchment areas channel from the western Ferry outwards continued to the 4 fathom contour seawards and bounded on the North by a line drawn East from the Ice House and on the South by a line drawn East from Mr. McMurray's Bungalow on the Dolphins Nose. This survey should be repeated 4 times in the year say in February, May, August and November

By these surveys the changes in the form of the Bar and entrance channels due to seasonal influences would be seen. Observations on the velocity and courses of the tidal currents, especially on the ebb, should also be made. A float sunk as deep as it can be to pass over the bar should be started at each successive hour of the ebb of an ordinary spring tide, and its exact position at every 5 minutes noted. Similar observations of a flood tide would also be desirable, but the Surveyor would

have

have to use his own judgement as to where the floats should be started so as to get into the Harbour.-

26. With the information afforded by those surveys and observations I have no doubt a competent Engineer would be enabled with something approaching absolute certainty to state to what extent and at what expense the entrance channel could be made to have a permanent position and increased depth.-

27. My second recommendation is that some final and definite arrangement be made regarding the right of reclamation of marsh land in the tidal backwaters and that the arrangement be based upon the principle that the flow and ebb of the tide is essentially the property of the Port Authorities and ought not without special evidence that the interests of trade and navigation will not be thereby damaged to be alienated for any other purpose whatever. This is a fixed principle

of

of which are about 2500 sq miles
The Northern river falls into the Palliport backwater at Munambum where there is an outlet into the sea always open with 6 ft of water on the bar.
The Southern river falls into the enormous Allippey backwater
What proportions of the flood waters of these rivers pass out to sea through the Cochin backwater is not known and cannot be estimated
The depth of water on the Bar at Cochin is from 11 to 13 ft and Mr Robertson in his report (page 25) gives his opinion that this depth is maintained almost entirely by tidal action
The depth on the bar does it is stated.

30

the bars of the other rivers increase during the monsoons
The position of the mouth and bar does not alter, the entrance is protected on both sides by stone groynes &c which have as yet answered the purpose.
It is believed that there is no rock or reef at or near the entrance or bar.

W. R. Barnard Lt Col
Supt & Ch Engr
T. S.

Trevandrum
7th June 82

of Port Conservancy and one which should be most jealously guarded. No doubt there are many exceptional cases in which the enforcement of the rule would be absurd – Bombay may be taken as an instance – but the rule has none the less a presumptive force, and the exceptions must be individually proved on special local grounds. I do not think Vizagapatam is an exception. Every square foot of capacity of the tidal channels is required for navigation and every one of the marsh that is cut off from the tidal overflow is so much loss to the channels.–

28. The original concession to the Roman Catholic Mission appears to have been made in ignorance of this principle and when at a subsequent stage, the principle was asserted, it was treated rather as a matter of debatable theory than

as

as the assertion of an acknowledged right. I think the Government should now take their stand upon this latter ground and claim the rights to the tidal backwater as a whole on behalf of Trade and Navigation.– With my present knowledge I should hardly be justified in suggesting a limit to the practical application of this claim but I confess to a strong feeling that where the enclosed areas have not been brought under actual cultivation it would be worth while to demolish the embankments and restore the tidal overflow. At any rate a continuance of the system of reclamation by embankment will undoubtedly lead to the obliteration of Vizagapatam as a second class port.

29. It must not be supposed that the loss of tidal water can be compensated for by any utilization of the land floods. As a rule – subject no doubt

to

Supplementary Note on Cochin Backwater

(2)

The Alleppey backwater approximates over 58 square miles which receives the drainage of 2000 square miles in addition to that it receives from the river at its Northern end, thus it is allowed no communication with the sea except through the Cochin opening.

The rise and fall of the tide is said to be but small.

In Mr Robertson's report page 45 it is stated that Mr Crawford found during the monsoon that the water in the Alleppey backwater was 3 ft-2 inches above the sea level, and there is a theory that the mud bank at Alleppey is due to this hydrostatic pressure (1½ lbs on the sq inch) forcing the mud up, in fact by causing mud springs

True copy

to many exceptions- tide water is beneficial, and river water is injurious to the entrance of a harbour. The river water brings constant accessions of solid matter which must form a cumulative deposit somewhere.- Tide water has no such tendency when once the channels are fully opened out.-

30. But while I most strongly deprecate reclamation by embankment, there is another kind of reclamation which I think might be carried out with profit to the reclaimer and advantage to the Harbour. This is to raise the whole area of a portion already near the level of high water by means of material dug from the marsh itself at a level between high and low water marks.- This of course is more expensive than embanking and might not be remunerative for mere agricultural purposes, but the land gained would be more immediately productive, and if the town

should

should require extension toward the Backwater, valuable building sites might be thus obtained. It should be a condition that the excavations be in continuous trenches, which would favor the flow of tide along them, and not in detached pits.- I may mention that this system of reclamation has been carried out to a considerable extent at Kurrachee by private enterprise and with profitable results.-

31. I would beg in conclusion to express my acknowledgment of the assistance and information furnished to me by the Port Officers at the several ports, Captain Jarvis, Captain Minto and Captain Farley, also by Mr. Nordmann, C.E. who had given much attention to the harbour of Vizagapatam 9 years ago and made an excellent survey of a portion of it.- To gentlemen

connected

The Paliport backwater has an approximate tidal basin of 13 sq miles and a drainage area of 800 square miles in addition to that of the Aungi river at its Southern end

If we take these 3 backwaters as one and they are all connected thus.

	Tidal basin	Drainage area
1st Paliport	13	800
2nd Cochin	32	2700
3 Alleppey	58	2000
Total sq miles	93	5500

We have a total tidal basin of 93 sq miles with a catchment basin of 5500 sq miles, with 2 outlets to the sea the one at Paliport with 5 to 6 feet of water during the dry season, which is deeper during the monsoon and the other at Cochin with 11 to 13

ft on the Bar in the dry season which does not deepen during the monsoon

The Paliport tidal basin is only 13 sq miles That of Cochin together with that of Alleppey with which it joins and forms one tidal basin 50 miles in length and 90 sq miles in area with one outlet at Cochin to the sea

8th June 82

connected with the mercantile firms
of the three places I am also indebted
for much information and kind
hospitality.—

I have the honor to be,
Sir
Your most Obedient Servant

W Parkes M Inst C.E.

8 Jan

23

My dear Col

I send you a supplemental note — in the one sent yesterday I did not give credit to the Allegheny Manchester which must be a very important factor in the election here

I think in the note now sent I give you the facts

Rawson comes on Saturday I wish

P 17

P. W. No. 2201

No. 5 E. d/ 12th April/82

[illegible]

Referred to the
Master Attendant,
Administrative Dept
Madras for remark.

Recd 6 Apl 82

×

+ J A B.M. 2nd [illegible]
11.4.82

R. H. Sankey
Col R.E.
Secy. to Govt.
P. W. Dept.

No. 5 E d/ 12th April 1882.

Plans given to
Technical Section

To The M. A. in original
to be returned —
J.L.S. 6-4
sent to orly 6.4.82

Referred

W

P 18

Administrative Department.

No. 4039 / 65

MADRAS,
Marine Office,
13th May 1882.

From
J. H. TAYLOR, ESQ., LIEUT., R.N.R.,
Master Attendant,
Administrative Department,
Madras,

To
Colonel R. H. Sankey. R.E. C.B.
Chief Secretary to Government,
Public Works Marine Department,
Chepauk Fort Saint George.

SIR,

In returning Mr Parkes' Memo on the Ports of Vizagapatam, Bimlipatam and Calingapatam, I have the honour to remark that that gentleman has very correctly demonstrat the inability of the trade of these ports either singly or combined to furnish any return worth speaking of for the outlay that woul be required for a 1st Class Harbour. Mr Parkes justly observes that the returns from trade might be multiplied tenfold and yet not justify the expense. For convenience of shipping and discharging cargo, Bimlipata has at present a great advantage over the others. It is very rarely that business is interrupted by weather whereas Vizagapa tam and Calingapatam are both dangerous

and

be visited soon
even before that
I shall leave Wednesday
or Tuesday with them
and that shd be
sufficient

Yours sincerely

Godavari Navigation

Max Discharge of
Godavari at commencement of Delta

1.21 mills Cub. ft per sec

In

and inconvenient one from the nature of its bar, the other from that of its beach. The trade of Vizagapatam and Bimlipatam might be amalgamated, but no railway having its termination at either of these Ports, and penetrating in a direct line to Raepore & would in my opinion much affect the trade of Calingapatam and Gopaulpore, both of which are very large and improving ports.

It is the peculiarity of the East Coast of this Presidency that no matter from what District a full crop of food grain, oil grain, indigo or other produce issues, there is invariably a fairly convenient port ready for its shipment. What more can be desired? Mr Parkes points out that careful survey should precede any official opinion about a Harbour, and full understanding arrived at regarding the currents, sand movements &c. That is an obvious truth. He seems to consider that the mouth of the Bimlipatam river, if it opened into a Harbour, would be very injurious to its use during heavy freshes and storm water periods. That is my opinion as often expressed in previous letters to Government. I consider that a backwater opening

into

into any Harbour in Cyclonic latitudes would be fatal to its efficiency, and the work of years be destroyed in one day, when a tempest made its appearance. Mr Parkes says that Vizagapatam river is much smaller than Bimlipatam River, and therefore seems to infer that this influence would be weakened. But he saw it only in fine weather, the hilly neighbourhood round Vizagapatam prevents the expenditure of any storm water on the road to the sea as is done on the sandy plains through which Bimlipatam river runs, and the rush of water, the destruction of villages and crops, the inundation of lands and of the town of Vizagapatam alone is a marked feature in cyclones, & which always visit the ports simultaneously hence my objection is not weakened.

The site I would propose for Harbours at Bimlipatam and Vizagapatam is the bay which in both cases is formed immediately round the Dolphin's Nose in Vizagapatam and the round hill at Bimlipatam. Here deeper water can be obtained far nearer inshore and a railway

Could

ha

ca

I

A

and

sufficient

Yours s

---

asked Mr Pringle

for

65

(1) area of Chilka lake

(2) max^m in bar

(3) min^m – do –

= Harris

(1) area of backwater

(2) do ~~catchment~~ of the river

(3) max^m in bar

(4) min^m do

17/5/82

Could run into the Harbour. In the case of Vizagapatam, however, a railway would have to cross the river before it could do this. I do not think that I have any more to add on this subject. My opinion derived from many years observations has been long before Government. The question of a 1st class Harbour is a serious one, and the Conditions demanded are capable of much discussion. Certainly Madras of intended as an example of Mr. Parkes methods at the North Ports is not a specimen of one, it is merely a shelter during ordinary weather and a great facility to trade. Madras should be well tested upon its merits when fully developed before more outlay is incurred on the Coasts of this Presidency.

I have the honour to be
Sir
Your most Obedient Servant.
JW Taylor
Master Attendant
Administrative Department.

26

Dowlaishwaram
25/5/82

My dear Col. Sankey.

Yours of 17th reached me yesterday some distance down the Commamur Canal.

About the bars & rise & fall of tides I cannot give you reliable information & I have thought it best to ask the Master Attendant Cocanada to send direct to you such information as he may have. & of course do so in his department if any that ought

P.W. (188) DEPARTMENT

C. No. 3192

From

THE MASTER ATTENDANT,
ADMINISTRATIVE DEPARTMENT,
Madras

To

THE ~~CHIEF~~ SECY. TO GOVERNMENT,
P.W. ~~MARINE~~ DEPARTMENT,
Fort St. George.

No. 4039

Dated 13th May 1882.
Received 13th May 1882.

No.

Subject.

Returning Mr. Parkes' Report on the ports of Vizagn. Bimlipatam and Calingapatam with remarks.

Cir. 13/6 R 14-6-82
R.L. 20-5

P.W. Department C.

69

Note by the Chief Engineer

In compliance with the request made by the Govt. of India in P.W. letter No. 301 M. d/ 12th Sept. 1881 Mr. Parkes after submission of his report on the restoration of the Madras Harbour Work proceeded to examine the capabilities of the ports of Vizagapatam, Bimlipatam and Calingapatam for the formation of Harbours for vessels of large draft.

2 His Report dated the 5th April 1882 is now subm for the consideration of

to know all about it.-

About the maximum flood discharges; I will enclose a table showing what we take to be the discharges over the various branches of the Anicut in floods of 12'. 13'. 14' & 15' going over.

12' is of fairly frequent occurrence (slightly above that in 1878 & 1879).

13' is more rare (as that in 1867 & 1875)

15' has only been known once - 1861.-

The ~~Vasishta~~ Gautami Godavari has its chief mouth near Hope Island, but also has a minor one south of Palaram Island named "Kathapalem" of Atlas sheet No 94. & there is the "Coringa River" which takes some flood water to Coringa bay.

The Vasishta Godavari has its chief mouth near Narsapur, but about 27 miles below the Anicut it sends off a large branch the "Vainateyam" or "Vainateya" Godavari which has its mouth near Bendamurlanka.--

What portions of the flood waters the minor branches of the Gautami Godavari take I have no observations of any kind to show - probably not a tenth.-

What portion of the Vasishta Godavari flood waters go down the Vainateya branch may be roughly arrived at from the fact that in the flood of 29/7/75 with just under

Government accompanied by remarks from the Master Attendant, Madras, letter No. 4039 d/ 13th May 1882.

Both officers are entirely agreed as to the impoſsibility of constructing harbours of the character specified for a sum which would hold out a hope of remunerative returns being obtained from the trade even if it had expanded to ten times that now existing and there would appear to be no reason to dispute this opinion which coincides with that which I have always maintained.

3 Considering the very few days each year during which cargo boats find it impoſsible to communicate with veſsels lying off any of the eastern coast ports, and the great facility with which steam veſsels lade and at present discharge cargoes it can scarcely be doubted that the time has not yet arrived for undertaking the construction of first claſs harbours

4 The question of constructing an Imperial Harbour at any point of the coast capable of affording shelter to the largest claſs of iron clads not only in time of war, but during

13 in the Anicut the water rose
on the upstream face of the [illegible]
Aqueduct (which spans this branch)
to top of towpath & was on the down-
-stream face 2 feet lower. The
Aqueduct has 49 arches of 40'
span & a waterway of 24812
square feet. A high coeff^t would
therefore give a discharge under it
of more than half the total
discharge over the two Vasishta
branches of the Anicut. But I
should not judge that to be
correct from the looks of the
two streams at their bifurcation
& should use a low coef^t
say half.

Yours sincerely
C. [illegible]

P.S. 26/5/82
I could not finish this yesterday in
time for post.

Traffic Code Form C.

INDIAN TELEGRAPH.

Class. X S. Local No. 1206

To (Station) Ootacamund From (Station) Vizianagram

Words.	Day.	Hour.	Minute.	Official Instructions.
37/3	30	10	1	urgent 27

To (Person) Col. Sankey From (Person) Ex Engr

1 number	2 one	3 area
4 of are	5 miles	6 backwater
7 two	8 thirds	9 mile
10 catchment	11 area	12 135
13 square	14 miles	15 maximum
16 depth	17 one	18 bar
19 in	20 flood	21 fifteen
22 feet	23 five	24 inches
25 minimum	26 at	27 this
28 season	29 two	30 feet
31 three	32 inches	33
34	35	36
37	38	39
40	41	42
43	44	45
46	47	48
49	50	51
52	53	54

(P. I. L.)—Govt. Tel. Press,—No. 531,—19-11-79,—100000.

Recd. from L. N. At Hrs. Mts., By

Sent to L. N. At Hrs. Mts., By

Telegraph Master

Date

OOTACAMUND 30-5-82

OOTACAMUND 1-6-82

cyclones, is one with which the Supreme Govt. can alone deal, and so far as concerns the enquiries now under reference does not come under consideration.

5. Such being the general conclusions arrived at it only remains to notice those points of Mr. Parkes' Report bearing upon the practical action to be taken in view to the possibilities of the future

1st Calingapatam Harbour

6. Though in Mr. Parkes' opinion the river mouth is not available as a boat Harbour he nevertheless

considers it possible, that by constructing a break-water along the reef of rocks to the south at a roughly approximate outlay of 50 Lakhs, to afford shelter for shipping.

7. To allow of a decision being arrived at a complete hydrographical survey of the roads is needed chiefly with the object of deciding as to the transporting influence of the long shore currents &ca. It is thought that arrangements should be made at an early date for a survey of this character

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Traffic Code Form C.

INDIAN TELEGRAPH.

Class. X S

Local No. 18

To (Station) Ootacamund

From (Station) Vizianagram

Words.	Day.	Hour.	Minute.	Official Instructions.
34	1	9	55	urgent / 38

To (Person) Sankey R.E. C.B.

From (Person) Ex Engr

1 your	2 yesterday	3 see
4 mine	5 by	6 part
7 a	8 day	9 of
10 [illegible]	11 two	12 and
13 three	14 fourths	15 square
16 miles	17 are	18 under
19 reclamation	20 see	21 also
22 plan	23 of	24 backwater
25 channel	26 which	27 is
28 now	29 two	30 thirds
31 square	32 mile	33 only
34 is	35 the	36 extreme
37 limits	38 of	39 total
40 action	41	42
43	44	45
46	47	48
49	50	51
52	53	54

Recd. from L. N.
At Hrs. Mts., By

Sent to L. N.
At Hrs. Mts., By

Telegraph Master.

Date

(T. 1 L)—Govt. Tel. Press,—No. 757,—23-2-81.—1000000.

OOTACAMUND 1-6-82

2d. Bimlipatam

8 Though here, there is a reef of rocks to the south somewhat similar to that at Calingapatam the general position is in Mr. Parkes' opinion less favorable for the construction of a 1st. class Harbour owing to the close proximity of the débouchure of the Chittavalsa river which in flood brings down a large quantity of silt; but here again a complete hydrographical survey is recommended and certainly appears necessary before a safe decision can be arrived at in regard to the fixing of the mouth of the river, and improving if possible the depth of water on the bar for cargo boats.

3. the Vizagapatam Harbour

9. Though much more favorably impressed with Vizagapatam, where an outer harbour off the Dolphin's nose (a revival of one of Sir Arthur Cotton's schemes, subsequently rejected) might he thinks be formed, Mr. Parkes observes that "thirty times the present trade might be carried "on, and yet the arguments "in favor of a first class

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P.S.
I am
Ex

Vizag.m Backwater
Sq. mile
under reclamation 2·75
" tidal action ·66
3·4

Say in round numbers
3½ square miles =
the whole backwater
area

Traffic Code Form C.

Class. D.S. INDIAN TELEGRAPH. Local No. 377

To (Station) Ootacamund From (Station) Calcutta

Words.	Day.	Hour.	Minute.	Official Instructions.
36	9	12	30	29

To (Person) Colonel Sankey. From (Person) Port Officer

Maximum range during
year high water
freshes to low
water dry season
twenty feet greatest
rise and fall
in any one
month fifteen feet
average spring rise
and fall thirteen
feet

Recd. from L. N. Sent to L. N.
At Hrs. Mts., By At Hrs. Mts., By
Date OOTACAMUND 9 6-82 Signaller/Master

(P. I. L.)—Govt. Tel. Press,—No. 757,—28 2 81,—1000000.

"harbour would be only one half as cogent as they were in the case of Madras eight years ago."

10. This opinion will probably be accepted as sufficiently conclusive for the present against the preparation of any harbour scheme, but Mr Parke proceeds to recommend also in this case the execution of a very careful and detailed hydrographic survey in the hopes of being able eventually to very greatly improve the depth of water in the bar &c. – and further to take action in reference to the scheme for reclaiming the backwater which has now for some years been in operation under concessions made to the Roman Catholic Mission.

11. As both these suggestions though perfectly legitimate and even desirable in themselves hold out hopes of improving the entrance to the backwater to an extent which I am convinced can never be realized – excepting in very small degree it appears desirable to offer certain observations thereon.

12. In para 26 the opinion is expressed that with the information afforded

30

To Ch Engr Vizagm

Your yesterday's telegm

Surely whole tidal area of backwater is more than two thirds mile.

31/5/82

by the survey as recommended "a competent Engineer would be enabled with something approaching absolute certainty to state at what expense the entrance channel could be made to have a permanent position, and increased depth" - The actual depth which might thus be secured on the bar is not stated and if only such as "to allow of the use of larger cargo boats" (para 22) this it may be thought would be attainable; but from the observations in the previous paragraph

where it is said that "if an inland dock (no doubt for 1st class vessels) is preferred with a deep water approach such a scheme would be perfectly practicable" Mr. Parkes must have then had clearly in view the possible permanent deepening of the water on the bar to at least 21 feet at low water. Large vessels could thus at high water just scrape in without bumping if there were no surfs, a state of matters by the way ~~to~~ which can be counted on for very few days however in the year. If this

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No. 686

Marine Office,
Cocanada
30th May 1852.

From
J. H. Baker Esqre.
Ag. Port Officer,
Cocanada.

To
Coll. Sankey C.B. R.E.
Ootacamund.

Sir,

At the request of the Superintending Engineer, 5th Circle, I have the honor to forward the following information

1. Depth of water on the bar of branch past Yanam of the Godavari that is

High water Springs 8½ feet.
Low " " 3 "
Springs rise 5½ feet.
Neaps " 3 "

2. Narsapore Branch.

High water Springs 17 feet.
Low " " 12 "
Springs rise 5 to 6 feet.
Neaps " 2 to 3 "

3. I regret I can give no reliable information regarding the Bendamoorlanka branch of the Godavari at present, but my best efforts shall be made to obtain it at the earliest opportunity when I

have assumed quite the minimum workable depth to be aimed at under Mr Parkes's suggestion

14 During the last season the minimum depth of water on the Vizagapatam bar has been only 2 feet 3 inches, and although during excessive flood the depth has been known to be momentarily scoured out to a full depth of 15 feet 5 inches this has never been maintained, and indeed has always it is understood decreased rapidly on the cessation of the exceptional cause.

15 There are in fact two very distinct reasons why a shallow bar must it is feared be always the rule, first the continued action of the surf, second the weak tidal scour owing to the very small difference of level between high and low water, even during spring tides.

16. As regards the first point Mr Robertson, who, as professional Harbour Engineer, was deputed by the Secretary of State in 1871 to examine the ports of the Madras Presidency observed, in reporting on Cochin (where the surf

I will again Communicate with you.

I have the honor to be
Sir,
Your most obedient Servant
F. H. Baker
Ag Port Officer.

Traffic Code Form C 1. S. P. No. 4000 G. T. Press,—No. 128,—27-5-80, 1000000.

INDIAN TELEGRAPH.

Class. XS					Local No. 1126
To (Station) Ootacamund				From (Station) Berhampur	
Words. 11/1	Day. 28	Hour. 9	Minute. 35	Official Instructions. urgent	
To (Person) Madras Works				From (Person) Ex Engr Ganjam Divn	

32

1 superintending	2 engineer	3 orissa
4 wires	5 one	6 344
7 two	8 22	9 three
10 13	11	11
13	14	15
16	17	19

Recd. from L. N. At Hrs. Mts., By

Sent to L. N. At Hrs. Mts., By

OOTACAMUND 28-5-90

From
The Ag Port Officer
Cocanada

To
Coll Sankey C.B. R.E.
Ootacamund

Dated 31st May 1892
Received

Giving information regarding the title &c of the Several Branches of the Gowtami: that of the Bendamurlanka will be given shortly.

"necessarily much milder
than at Vizagapatam)
that "the surf is always
"striving to restore the
"natural profile of concavity
"of the shore — After the
"current has flowed out
"to sea for nearly a mile,
"it is no longer able to
"resist and keep down
"the ever working and
"powerful efforts of the
"waves to reform the profile
"of the coast by continuing
"the ~~breach~~ beach line which
"has broken through the
"outgoing current."

"Apparently all professional

P 27

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Harbour Engineers agree in
this statement; but the
following observations by
Mr D. Stevenson seem so
a — apposite as to deserve further
quotation. This authority
observes that the waves
throw up "a girdle of
"light or heavy material
* * * round every bay
"and headland of our
"(English) coast, and the
"entrances to rivers form no
"exception. The effects of
"this constant action of the
"sea is to form a continuous
"line of beach across the
"mouths of our tidal rivers

tides. In regard to the exceptional depths always recorded on the Nun Jalun bar - and the Chief Engineer's opinion thereon - I beg to observe that in my opinion the deep bar of the Kundalowo is the result of the peculiar features of the tidal & catchment basin of this river, the former being confined to a deep channel merely & does not spread out into shallow lagoons - and the catchment being of great fall & confined to steep valleys. The velocity of discharge is therefore great. - This stream is tidal & navigable up to within a few miles of Gordon, on the Northern Trunk Road to Dellire, very circuitous in its course. It is worth while improving as a feeder to canal.

"and inlets." He apparently
attaches little importance
to river currents as agents
in the production or regulation
of bars, observing that
"a bar would be formed
"although the outgoing current
"held not one particle
"of matter in suspension"

18 To shew how completely
the over working surf
particularly along the East
Coast of the Peninsula
is the main cause of all
bars at river mouths
and what very slight
or permanent influence
is exercised by either the

extent of the backwaters
and tidal flow through
the open mouths or by the
volume of water discharged
by the feeding rivers, I have here
collected a few facts, in
the annexed Table A.
connected with the chief
of our South Indian ports which
though admittedly incom-
-plete will at least
serve to demonstrate the
truth of this position.

19 First, it will be noted
that the great tidal
Estuary at Pulicat with
178 square miles of area
though on occasion of
excessive flood able t

Statement of areas of certain Tidal Basons showing also areas of Catchment and of discharges - along Buckingham Canal.

Tidal Basons	Tidal area	Catchment drainage area	Discharges of catchment Bason $*625\,M^{\frac{2}{3}} = D$ cu ft per second	Depth on Bars		Remarks
				Maximum	Minimum	
	1	2	3	4	5	
Pulicat Lake	178	2,057	92847.5	15	3'	The Pulicat Bar closed this year. It closed in the famine year 1879, and is understood to suffer in seasons of short rainfall. The Ennore & Covelong Bars are kept open artificially. The Kundaleru bar is seen open.
Ennore Backwater	6	962	54562.5	10	3	
Covelong "	14	279	24187.5	6	3	
Kundaleru "	16	1,198	64687.5	24	8	

*Note. Formula given by Major [illegible] [illegible] R.E.

[illegible] Buckman
Col. Ex. Engr.

[illegible]
Sub. Engr. P.W.D.
23-5-82.

34

Calculated High flood discharges - River Godavari -
- At the Anicut -

Dowlaishwaram Branch		Ralli Branch		Madur Branch		Vizzeswaram Branch	
Feet on Anicut	Discharge in C. ft. per second	Feet on crest of Anicut	Discharge in C. ft. per second	Feet on Anicut	Discharge in C. ft. per second	Feet on Anicut	Discharge in C. ft. per second
12'	385665	12'	223280	12'	120852	12'	202825
13'	401128	13'	232232	13'	125697	13'	210957
14'	420492	14'	243443	14'	131765	14'	221141
15'	439857	15'	256654	15'	137833	15'	231325

<... These 2 join a short distance below the Anicuts and form the Gowtami Godavari - Chief mouth at Hope Island

<- These 2 join below the Anicut & form the Vasista Godavari - Chief mouth near Narsapur - with branch (Vainteyam) going into sea near Bendamurlanka -

[illegible]
26/5/82

deepen the water on the bar at its only open mouth, to 15 feet can maintain a minimum depth of no more than 3 feet; and often not even that, for the mouth closed entirely in 1879 and has done so again this year.

20. The next great tidal Estuary is that of Cochin on the West Coast. Here the area of the backwater is about 32 square miles and the conditions under which the mouth is kept open are very much more favorable than

(i.e. excluding the enormous backwaters ~~[illegible]~~ with which it is connected & which if added would only give a total of 490 square miles)

Pulicat. Not only is the surf of a very much milder character but the bottom is to a great extent mud, a material much less easily acted on by the waves than fine sand. Yet here with almost unrivalled advantages the minimum depth on the bar is only 11 feet and the maximum 14 feet. To shelter this bar and thus, by preventing the action of the surf to give the tidal action full and free play, Mr Parkes himself not long estimated the cost

Keep with

Mr Parkes
Vizag Bund
& Kalingapatam
Reports

No. 2364 — 35

FROM The Port Officer of Calcutta.

To Colonel Sankey
Ootacamund

PORT OFFICE;

Dated, FORT WILLIAM, *the* 9th June 1882

SIR,

I HAVE the honor to inform you of the despatch of the following Telegram to your address this day;—

"Maximum range during year high water
" freshes to low water dry season twenty
" feet greatest rise and fall in any one
" month fifteen feet. average spring rise
" and fall thirteen feet."—

I have the honor to be,
SIR,
Your most obedient Servant,

Port Officer of Calcutta.

P. J. P.—Ind. 320—S. O. F. 1197—200—25-7-78.

at 80 Lakhs.

21 The only bar along about the whole East coast, which preserves any moderate depth is that of the Kundaleru river near Krishnapatam. Here though the catchment area of the feeding river and also of the tidal Estuary are both of moderate dimensions (though ~~vastly~~ greatly in excess of Vizagapatam) there is generally a minimum depth of about 8 feet of water on the bar. There can be no doubt that this is the

result of two peculiarities.

The river mouth, is placed to the north of the great Armagon Shoal and is thus shielded, in a very exceptional manner from the effects of the surf brought up by the S.W. monsoon. The bottom is also composed of mud. But even with all these advantages and with a deep river channel to which the stream is confined, a catchment area and flood discharge nine times that at Vizagapatam &c. only 8 feet of water can be counted on for the use of vessels

Keep with

PORT OFFICE, CALCUTTA 36

The 9. June 1882

My dear Col. Sankey.

In continuation of explanation of my telegram. I enclose a small abstract which shows more clearly the state of things – during the freshets the river rises much higher & does not fall so low as during the dry season so that the annual range of tide is very much more than that of any particular single tide. As a rule the spring range may be taken at 13 feet.

The zero of the gauge is the sill of the Kidderpore dock – In great haste

Yours very truly

22. Even were the whole area of the Vizagapatam Estuary now in process of reclamation by the Catholic Mission (viz.t 2.75 square miles) added to the portion still untouched (~~0.66~~ 0.66 square miles) the total area thus available would only be 3.4 square miles, which is a mere trifle compared with others all along both coasts - The fact is the action of the surf cannot be got rid of without unduly costly sheltering works and unless these be undertaken it is to the

best of my judgment useless to expect anything more than a possible slight improvement of the depth of water on the bar.

23. The second cause of shallow bars along our coasts is the small rise and fall of the tide - To those accustomed to the tidal range usually met with in England (e.g. 26 feet at Liverpool, 16 feet at Holyhead, 37 feet at Weston-super-Mare &c. and even some ~~18~~ 20 feet at Calcutta, 15 feet at Bombay and 12 feet in the Gulf of Cutch ~~[illegible]~~) sufficient account is not likely

Keep with

Range of tides

Calcutta

to be taken of the comparatively trifling rise and fall with which we have to deal, so far north on the coast of the Peninsula ~~Certainly~~ as the latitude of Vizagapatam. Here the maximum difference at spring tides in 1881 was as shewn by Captain Baird's tables only 5 feet 9 inches, and it may be assumed that having as a rule to work with a very much less height of tide than this the velocities producible over the bar must be comparatively feeble, no matter what the arrangements adopted for conserving and utilizing the tide water in its passage to and from the backwater.

24 In my previous report on the Vizagapatam Harbour printed with G.O. 13th Augt 1880 No 1939 W, I pointed out (paras 52 & 53) the value which might attend giving up the reclamations though there were some counterbalancing facts to be considered.

25 The enquiries then started have not been completed owing to the hands of the Executive Engineers being too full with other work, but there is no reason why

Keep with

My dear Col. Sankey

Yrs of 17th inst. reached me on Saturday, and as I had no in-formation regarding depth or bar of Chilka lake entrance I wrote to [illegible] and sent on the result to you [illegible]

The area 346 sqr miles is that of the dry season, increasing in rains to about 450 sq miles. The maximum breadth of the sea entrance is 657' and minimum (181) 213'.

You [illegible] find some [illegible]

an effort should not now be made either by placing the surveys contemplated by Mr. Parkes under charge of the A Project Division (now working in Ganjam) or through specially appointed agency.

R. H. Sankey Colonel R.E.
Chief Engineer, P.W. Dept.

Ootacamund
7th June 1882

Table A to accompany
Note by the Chief Engr.
d/ 7th June 1882

particulars in vol II of Hunters
Imperial Gazetteer should you require
them —

Truly yours

Table A to accompany Note by the Chief Engineer dated 7th June 1882

Portion Tidal Estuary having a connection generally open with the sea.		Littoral District	Area of Tidal Estuary	Catchment area of the feeding rivers	Maximum flood discharge of ditto—	Depth of water on the bars at the open mouths				Difference between high and low water			
						Maximum		Minimum		Spring tides		Neap tides	
			Sq: mile	Sq: mile	Cubic feet per second	Feet	Inches	Feet	Inches	Feet	Inches	Feet	Inches
1		2	3	4	5	6	7	8	9	10	11	12	13.
Vizagapatam ……	EAST COAST	Vizagapatam	(a) 0.66	135	?	15	5	2	3	5 (b)	9	1 (b)	2
Godavari river mouths													
(a) Yanam — — —		Godavari	?	112,200	1,350,000	8	6	3	0	5	6	1	2
(b) Narsapur — —		— —	—	—	— —	17	0	?	?				
(c) Bendamurlanka		— —	—	—	— —	?	?	?	?				
Kundalem ……		Nellore	16	1198	64,689	?	6	8	0				
Pulicat Lake ……			178	2057	92,817	15	0	3	0				
Ennore Backwater		Chingleput	6	962	54,562	10	0	3	0				
Covelong — do —			14	279	24,187	6	0	3	0				
Cochin — do —	West Coast	Cochin	52 (c)	2700	?	14	0	11	0				
Beypore — do —		Malabar	6	1050	?	12	0	6	0	3 (b)	6	1 (b)	0
Mangalore — do —		S. Canara	10	1830	?	?	0	6	0				

Remarks

(a) Area under reclamation is 2.95 sq: miles so total area of the backwater would if free be 3.4 sq: miles

(b) Taken from Capt Baird's Tide Table for 1881 generally speaking the height of the tide decreases gradually to the south of the Bay of Bengal, the maximum height of springs at Madras being only ~~3½~~ 1¼ feet, and of neaps ~~1 foot~~ 18 inches, the same rule hold good for the west coast ports, those ~~again~~ situated to the south ~~being~~ having very low tides while at Bombay the difference is as much as 15 feet between high & low water springs.

(Pencil note)

At Pamban there is at times no sensible difference of level at neap tides

(c) To this area must also be added tract of the Alleppy backwater (58 square miles with 2000 sq: miles of catchment) which vents itself alternately at Cochin thus making the total area whose drainage passes over the bar at the latter place = 90 square miles of backwater and 4700 square miles of upper catchment

Ootacamund
7th June 1882

[illegible] Colonel R.E.
Chief Engineer, P.W.Dept.

Keep with

Copy of Telegram
28th May 82

"Superintending Engineer Orissa wires
one 344 two 22 three 13"

Monthly Height of Tide at Calcutta

Month	Depth at gauge at lowest tide during the month				Depth at guage at highest tide during the month				Monthly maximum amplitude of tide wave				Mean		
	1880-81		1881-82		1880-81		1881-82		1880-81		1881-82				
April	3	6	3	4	17	0	15	6	13	6	12	2	12	10	
May	4	2	4	0	17	6	17	0	13	4	13	0	13	2	
June	5	7	3	11	18	7	17	9	13	0	13	10	13	5	
July	7	1	4	4	20	1	19	4	13	0	15	0	14	0	
August	8	7	7	7	20	7	20	8	12	0	13	1	12	6	
September	8	2	8	3	21	4	21	8	13	2	13	5	13	3	river at its highest
October	7	5	6	1	20	1	19	9	12	8	13	8	13.	2	
November	5	3	4	0	18	2	16	0	12	11	12	10	12	10.	
December	3	10	2	6	16	8	16	0	12	10	12	6	12	8	
January	2	10	2	3	16	0	15	8	13	2	13	5	13	3	
February	2	11	1	9	15	2	15	11	12	3	14	2	13	2	river at its lowest
March	2	10	2	1	16	0	16	1	13	2	14	0	13	7	
													12)37	10	Annual mean
													13.	2	maximum rise and fall monthly

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(draft order)

B & R
d works

H.E.

1 G.O. 9th March 1882 No 612 ..

2 Mr Parkes's Report dated 5th April 1882

3 Letter from Captain Taylor No 4039 dated 13th May 1882

4 Note by the Chief Engineer dated 7th June 1882

[illegible]

No. 1718 W. dated order 8 July/82

34 -

Forwarded to the Govt. of India ~~with the~~ in reply ~~reference~~ to their letter No 82 M dated 13 Feby 1882 with the observation ~~that~~ this Government considers it unnecessary to consider any schemes at present for ~~the construction~~ of harbours suitable for vessels of large draft at either Vizagapatam Bimlipatam or Calingapatam

List of Plans sent to Mr. Molesworth.

41

1. Chart of the Bay of Bengal.
2. Survey of the Vizagapatam Harbour & part of back Water. No. 1 & 2.
3. Longl. Sections along the Sea & back Water near Vizagapatam No. 3.
4. Sketch map Section & levels near town of Vizagapatam. No. 4.
5. Proposed Groynes on the beach at Vizagapatam.
6. Survey of the Sea port & backwater of — do —
7. Key plan Shewing the position of the Sections taken across the Backwater in the months of October 1879 at Vizagapatam.
8. Cross Sections taken across the backwater at Vizagapatam.

22nd Feby/82.

JW.

The Chief Engineer will report what arrangements can be made for giving effect to Mr Parkes's suggestion for the execution of careful & detailed hydrographic surveys of the three ports mentioned

10/6/82

(H.E.)

No. 1719 W. d/8 July/82

Copy of the above forwarded to the Government of India

S.C. Despd. 1517

S.C. Despd. 1517

S.E. 4th Circle
C.E. P.W.D.
Marine Dept.

2 Retn. to Governmt

For orders

The question dealt with in these papers is of so technical a character that I have thought it desirable to draw up a separate note on the subject which has been perused by the Hon'ble Mr Huddleston

If the Govt. now approve it may be thought sufficient to forward copy of these papers to the G of I in disposal of their letter No 82 M dt. 13 Feby. 1882 (See G.O. 9th March 1882 No 612 A.W.) and observing that arrangements will be made as circumstances

admit for giving
effect to Mr Parkes's
suggestions in reference
to the execution of
careful hydrographic
surveys of the 3 harbours
in question

A draft to this
effect accompanies

10/6/82

P.C.
B. No. 2192 W. 9-6-82.
C. No. $\frac{352}{352}$ W. 9-2-84.

10-2-92
7-7-06

2201
3192

Govt. of (1882) Madras

PUBLIC WORKS.

Press 10/7

G. O. 8 July 1882. No. 1718/1719 W

Nos.

Ports of Vizagapatam,
Bimlipatam & Calingapatam
Capabilities of the — for
the formation of 1st Class
harbours. Mr Parkes'
Report & other papers as
regarding the — forwarded
to the Govt of I with certain
observations.

Ditto