(1) பக்கங்களின் எண்ணிக்கை 104

(2) புதுக்கித் திருப்பிய நாள் 8/89

(3) ஆதாரங்குறிப்பவர் சுருக்கொப்பம்

தமிழ்நாடு ஆவணக் காப்பகம்.

(7)

தமிழ்நாடு அரசு

P. W. D. துறை

அரசாணை எண்.
மு. கோப்புத் தாள் எண். 2193

அச்சகம்
பலவகை

நாள் : 12-8-1889 19

படிக்கவோ கண்டபடி கையாளவோ கூடாது

52 Sheets

வண, கா-1—18,000—15-6-87.

6th June 1889, No. $\frac{1492\ W.}{A}$, Public Works.

2193

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

Read—the following paper:—

From Sir RICHARD BARLOW, *Bart.*, C.S., Chairman, Harbour Trust Board, to the Chief Secretary to Government, Marine Department, dated Madras, 29th May 1889, No. 1906.

Referring to G.O., No. 1139 W., Public Works, dated 29th ultimo, I have the honor to inquire (*a*) whether when the usual time has elapsed to allow the 44 abutment bl[illegible] "set"—which will be about the middle of July—they are at once to be placed in [illegible] the north arm of the harbour, at the spot approved by Colonel Mea[illegible] in his letter published [illegible], No. 321 W., Public Works, dated 19th March 1889, or (*b*) whether further orders are expected from the Right Honorable the Secretary of State and should be awaited.

Transferred to the Public Works Department.

(By order.)

(Signed) W. S. MEYER,
Assistant Secretary.

31st May 1889.

Order—dated 6th June 1889, No. $\frac{1492\ W.}{A}$, Public Works.

The orders of the Secretary of State on the point raised have been requested by wire.

(True Extract.)

(Signed) R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Ag. Joint Secy. to Govt., P.W.D.

To the Chairman, Harbour Trust Board.

Exd. J. Henricus.
Spare Copies

2193

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

READ—the following paper:—

From Sir RICHARD BARLOW, *Bart.*, C.S., Chairman, Harbour Trust Board, to the Chief Secretary to Government, Marine Department, dated Madras, 29th May 1889, No. 1906.

Referring to G.O., No. 1139 W., Public Works, dated 29th ultimo, I have the honor to inquire (*a*) whether when the usual time has elapsed to allow the 44 abutment blocks to "set"—which will be about the middle of July—they are at once to be placed in position in the north arm of the harbour, at the spot approved by Colonel Mead in his letter published in G.O., No. 821 W., Public Works, dated 19th March 1889, or (*b*) whether further orders are expected from the Right Honorable the Secretary of State and should be awaited.

Transferred to the Public Works Department.

(By order.)

(Signed) W. S. MEYER,
Assistant Secretary.

31st May 1889.

ORDER—dated 6th June 1889, No. $\frac{1492\ W.}{A}$, Public Works.

The orders of the Secretary of State on the point raised have been requested by wire.

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Ag. Joint Secy. to Govt., P.W.D.

To the Chairman, Harbour Trust Board.

Exd. J. Henricus.
Spare Copies

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1889} Madras.

PUBLIC WORKS.

Dated June, 6th.

Recd. *Encl.*

G.O., 6th June 1889, No. $\frac{1492\ W.}{A}$

JUNE.

Madras Harbour

Ordered that the Secretary of State be requested to communicate early orders in regard to the plan of entrance to be finally adopted.

PUBLIC WORKS SECRETARIAT

PUBLIC WORKS DEPARTMENT.

LETTER—to

THE RIGHT HONORABLE THE SECRETARY OF STATE FOR INDIA.

MY LORD,

In forwarding for your Lordship's information the accompanying copy of a telegram despatched on the 5th June 1889, we have the honor to invite attention to our Proceedings,* No. 821 W., dated 19th March 1889, which will show the arrangements which we have made for the prosecution of work on the northern arm of the harbour, pending decision of the question of entrance now before your Lordship. As stated in our telegram of the 5th June, the abutment blocks ordered to be got ready in your Lordship's telegram of the 24th December 1888 will have "set" and be ready for use by the middle of July, while the north arm will be sufficiently advanced by the 18th June to commence laying the abutment blocks at the point described in the Chief Engineer's note of the 16th March 1889, printed with our Proceedings of the 19th idem. To prevent delay of the work we have sent the telegram enclosed, and request that your Lordship's orders may be transmitted by wire. We trust that we shall soon be in possession of your Lordship's views as to the plan of entrance to be finally adopted.

* The tracings referred to in these Proceedings will follow.

We have the honor to be,
My Lord,
Your Lordship's most obedient, humble servants,

(Signed) C. G. ARBUTHNOT.
(„) H. E. STOKES.
(„) J. H. GARSTIN.

OOTACAMUND,
6th June 1889.

Exd. J. Henricus.

GOVT. OF MADRAS.

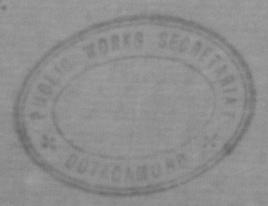
PUBLIC WORKS DEPARTMENT.

(Copy.)

LETTER to the Right Honorable the Secretary of State for India.

No. 11 / 1492 W., dated 6th June 1889.

Requesting early orders in regard to the plan of entrance to be finally adopted for the Madras Harbour.



17TH JUNE 1889, No. 1583 W., PUBLIC WORKS.

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GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

READ—the following papers :—

Letter from the Chairman, Harbour Trust Board, dated 29th May 1889, No. 1906.

Referring to G.O., No. 1139 W., Public Works, dated 29th ultimo, I have the honor to inquire (*a*) whether when the usual time has elapsed to allow the 44 abutment blocks to "set"—which will be about the middle of July—they are at once to be placed in position in the north arm of the harbour, at the spot approved by Colonel Mead in his letter published in G.O., No. 821 W., Public Works, dated 19th March 1889, or (*b*) whether further orders are expected from the Right Honorable the Secretary of State, and should be awaited.

Telegram to the Chairman, Harbour Trust Board, dated 3rd June 1889.

Your No. 1906, dated 29th May. When is north arm expected to be advanced to the point in question?

Telegram from the Chairman, Harbour Trust Board, dated 3rd June 1889.

Point in question will be reached on or about 18th instant.

Telegram to the Secretary of State, dated 5th June 1889, No. 294.

Your despatch No. 2 P.W., dated 24th January 1889, para. 3. Abutment blocks ready middle of July and north pier will be ready for them 18th June. Is abutment to be built? If so, please telegraph the one word "yes."

Telegram from the Secretary of State, dated 9th June 1889.

Your telegram of June 5th. Yes, provided progress of north breakwater is not delayed thereby, not otherwise.

ORDER—dated 17th June 1889, No. 1583 W., Public Works.

The telegram from the Secretary of State, recorded above, is communicated to the Chairman, Harbour Trust Board, with reference to his letter of the 29th May 1889, No. 1906.

(True Extract.)

(Signed) R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Ag. Joint Secy. to Govt., P.W.D.

To the Chairman, Harbour Trust Board.
" Marine Department.

Ferd. J. Henricus.
Spare Copies

2193

ENCLOSURE.

Telegram to the Right Honorable the Secretary of State for India, London, dated 5th June 1889.

Your despatch No. 2, Public Works, dated 24th January 1889, para 3. Abutment blocks ready middle July and north pier ready for them 18th June. Is abutment to be built? If so, telegraph the one word " yes."

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BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1889} Madras.

PUBLIC WORKS.

Dated June, 17*th*.

Read. *Encl.*

G.O., 17th June 1889, No. 1583 W.

JUNE.

Madras Harbour Works

Telegram from the Secretary of State sanctioning the construction of the abutment, communicated to the Chairman, Harbour Trust Board.

PUBLIC WORKS SECRETARIAT

2193

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

READ—the following paper:—

Despatch from the Right Honorable Lord CROSS, Her Majesty's Secretary of State for India, to His Excellency the Right Honorable the Governor in Council, Fort St. George, dated India office, London, 23rd May 1889, No. 7, Public Works.

I have received your Excellency's Public Works letter No. 7, dated 2nd March 1889, reporting the proceedings taken by your Government in connection with my Public Works despatch No. 2, dated 24th January 1889.

2. I now forward, for your Excellency's consideration, copy of a preliminary report * which has been drawn up by Sir Alexander Rendel, K.C.I.E., stating his views with regard to the reconstruction of Madras Harbour and the position of the entrance.

* Dated 16th April 1889.

3. It will be seen that Sir Alexander Rendel considers that greater precautions should be taken to strengthen the whole structure, and suggests important modifications in the method of completing the works. He further expresses an opinion in favor of retaining the eastern entrance, and of providing dock accommodation and wharfage inside, or in extension of, the present harbour. His report will no doubt receive the most careful consideration from your Government, who should communicate their views on the important recommendations made in it to the Government of India, who will then address me on the subject. It should be understood that the question of Sir A. Rendel's visiting Madras will be taken up hereafter, and that, so far as his present suggestions are accepted, further detailed instructions will be drawn up in due course.

ENCLOSURE.

From Sir ALEXANDER RENDEL, K.C.I.E., to Sir JULAND DANVERS, K.C.S.I., dated 8, Great George Street, Westminster, S.W., 16th April 1889.

I have read and considered the papers on the subject of Madras Harbour forwarded to me with your memorandum of the 27th March, and beg to make the following observations upon them.

2. The papers sent to me comprise a despatch from the Government of Madras to the Secretary of State, dated 2nd March 1889, forwarding correspondence and an Order, dated 2nd March 1889, which seems to be the result of the correspondence. Para. 4 of this order to which you specially direct my attention is as follows: "The Government approve of the Board's proposal to continue the extension of the north pier, sanctioned by the Secretary of State, with 28 feet of wavebreaker protection only for the present, but on no account are wavebreaker blocks to be put down on the north pier at the place where the north pier would have to be taken up, should Mr. Parkes' proposals be carried out."

3. The sanctioned section for the eastern faces of both north and south breakwaters appears to be a wall formed of large concrete blocks laid diagonally on a rough rubble substructure at the level of 20 feet below low water, and carried up to 15 feet above low water, or 12 feet above

7

high water, its bottom width being 28 feet and its top width 24 feet. This wall is protected from wave action by concrete blocks, weighing about 30 tons each, thrown into the sea in front of it to a section measuring roughly 40 feet along the high-water line, whence they are assumed to fall naturally at a slope of 1 vertical to 1½ horizontal down to the rubble substructure. The surface of the substructure inside the wall is also covered at its foot with large bags of concrete to prevent the disturbance of the rubble and the consequent movement of the wall.

4. This section was apparently that fixed upon by the committee of 1883, modified in some respects subsequently by Mr. Parkes. It may be presumed that it was adopted by the committee in consequence of a desire to interfere with the original plan of the breakwaters in the least possible degree. I say so because I find that one member of the committee, Sir J. Hawkshaw, has constructed the Marmagoa breakwater on a section measuring 34 feet wide at the bottom and 30 feet wide at the top, and that another member, Sir J. Coode, has constructed the Colombo breakwater to a section measuring 36 feet at the bottom and 34 feet at the top, and I can find no breakwater section, bearing in mind that it is not monolithic, so slight as that adopted at Madras. I also find that the amount of wavebreaker at Marmagoa is very small, and that at Colombo it is entirely absent, being replaced at Colombo by a layer of concrete in large bags laid on the top of the rubble deposit, similar to that proposed for the inside of the Madras breakwaters. It may therefore, I think, be fairly surmised that the section advised by the committee was not the one which they thought the best that could be devised, but the one which they thought best under the general circumstances of the case.

5. In my opinion, a wall of this class, which depends for its existence on aid derived from something else, is an unsatisfactory structure. I should like to see the present section increased to that employed at Colombo, and, with such a section, I think that a wavebreaker measuring 10 or 15 feet on the high-water line would be found sufficient. The wavebreaker in that case would in fact be more a protector of the rubble substructure than of the wall, and it is a question whether, instead of throwing in the wavebreaker blocks at random, they should not be simply laid in orderly rows at the foot of the wall. This would be more in accordance with both the Colombo and the Marmagoa plans, and with that which, after a costly experience, has been found to give satisfactory results at the Tyne piers. If the present plan be adhered to, it would be well, I think, to fill in the vacant spaces between the wavebreaker blocks with rubble stone.

6. I attach the greatest importance to a solid concrete capping on the top of the pier. I observe that in the sanctioned plan it begins at the level of 6 feet above high water and is only 6 feet thick. I do not know what height of wave may be expected in Madras; but I do know that a thicker capping aided by a heavy masonry parapet was blown up at Wick, and I think it highly desirable, as well for its own sake as for that of the blocks below it, which it materially helps to keep in place, that it should be of a greater thickness. I do not see why it should not be commenced at about the level of high water. The wet concrete about that level might perhaps require some temporary protection, but this, at any rate in some seasons of the year, could be readily supplied. Many engineers, and myself amongst the number, have used wet concrete in breakwaters under worse circumstances than those which are encountered at Madras. If the capping cannot be commenced nearer the line of high water, it should, I think, be carried higher than 12 feet above high water in the form of a wide and lofty parapet. It should be remembered that in England these cappings commence near the level of low water, this being possible wherever the range of tide is material, and that thus a deep capping is obtained without raising the work very high above high water.

7. In respect to cost, although I have not gone into the question, for I am only dealing with the first consideration, security, still I doubt if the suggestions I have made would add to it if adopted in a very serious degree.

8. The heads of the breakwaters are apparently to be built to a much stronger section than the rest of the work, stronger even than I have suggested. They are also to be founded at a lower level. Both these modifications I think wise; but, before the heads are commenced, I should hope that some such plan as that adopted at Colombo, of iron caissons, will be considered. The entrance is now to be so narrow that an accident to the heads might seriously interfere with the access to the harbour, and the more nearly monolithic they can be made the less the risk of accident to them will be, and the greater the safety of the lighthouse which must be built on one at least of them.

9. Having made these remarks, I have now to say upon the first section of para. 4 of the Government Order that, inasmuch as the section of the wall is less than practice in other places justifies, it is in my opinion undesirable that the wavebreaker should be reduced from a length of 40 feet to a length of 28 feet, but I would rather see the wall strengthened from a top width of 24 feet to a top width of 34 feet, in which case I think the wavebreaker might be reduced to a high-water width of from 10 to 15 feet, or better still, replaced by blocks or bags of concrete laid in regular layers at the foot of the wall. I assume that the blocks will weigh not less than 30 tons, and should like them heavier if the titans by which they are set are of sufficient strength.

10. In respect to the second section of para. 4, if I understand it rightly, it means that a part of the north breakwater is not to be protected by a wavebreaker at all until the position of

the entrance is finally determined by experiment. If this be the meaning of the paragraph, then we must consider if the wall is strong enough alone to stand an exceptionally heavy gale. However temporary may be the existence of the wall, it must plainly from the first be made to a section that will stand under the worst possible circumstances. It seems to be supposed that the wall, as now designed, will stand under the worst circumstances without the aid of the wavebreaker. I confess that I have doubts on the subject, and should like to see the wavebreaker constructed, *pari passu*, with the wall.

11. This brings me to the vexed question of the position of the entrance; and here it appears to me that, so long as the question of its ultimate position remains undetermined, there will be vacillations and delays, and perhaps mistakes ending in disasters, and that it is highly desirable to set the question at rest as soon as possible. For my part, I cannot believe that the science of marine engineering is in so low a condition that a point of this kind can only be determined by an experiment which contemplates the possibility of our having to resort to the costly process of taking up several hundred feet of breakwater. And I feel it so necessary that the question should be settled at the earliest possible moment once and for ever, that, at the risk of being thought too ready to express an opinion upon it, I do not hesitate to say that, in my judgment, the eastern entrance as at present designed is a proper one, is a better one than any alternative which has yet been proposed, and is the best which, under present circumstances, can be devised.

12. To make a harbour secure at the expense of its accessibility, which to my mind is what the best of the north-east entrances yet proposed would do, is a worse fault than to make it accessible at the expense of its security, because we can as a rule improve the security by internal works, and we cannot improve the accessibility except by costly alterations which will diminish the security.

13. The simple fact, in my judgment, is that the present scheme for a harbour at Madras will make no harbour worth the name at all. What it does make is a satisfactory entrance to a harbour yet to be designed within it.

14. A harbour, it seems to me, is of little value to Madras unless it provides a quay wall alongside which ships may lie as in a dock, and take in or discharge their cargoes in perfect quiet and security, and there seems no difficulty in providing such a quayage at a cost which the result would fully justify. But, be the cost what it may, it seems to me that Madras is worth a safe and commodious harbour.

15. The type of harbour to which Madras belongs is very much that of Whitehaven, a copy of the chart of which I append to this report. Many years ago I was Consulting Engineer to this harbour, and I know it well. We have here an outer harbour, forming an approach, and nothing but an approach, to two inner harbours, each so enclosed by quays that ships lie undisturbed within them, with a space between them opening directly on to the outer harbour, and forming a beaching ground for ships and waves. It would be easy to devise a similar scheme for Madras, which would give it, say, 60 acres of enclosed dock (gates of course are not required), 9,000 feet lineal of wharfage, and 40 acres of quay space, enough to make it a first-class port for a very large trade. Or, if it be preferred, the adjacent shores outside the harbour might be utilised for the purpose, and of course a combination of both ideas is possible. I claim no priority in suggesting either plan. Mr. Parkes has, I believe, roughed out the latter idea, Mr. Thorowgood, the former, quite independently of me. But I may say, as a corroboration of their views more than anything else, that the first of the two schemes I have now suggested I broached when the harbour was first proposed; and I may add that, if it be adopted, the entrance might be kept at the width originally given to it of 500 feet, which is by no means more than it should be.

16. I would remark, in conclusion, that I have no exact information as to the quantity of cement employed in making the concrete and concrete blocks. I refer to the point here because my experience leads me to think that there has been a tendency on the part of engineers of late years to use too small a proportion of cement, the result of which has been some serious failures. The importance of making blocks as nearly water-tight as possible is now greatly increased by the discovery lately made that at least some Portland cements are, as at present made, slowly soluble in sea-water, which deposits its magnesia in the concrete, taking up in place of it the lime of the cement. So long, however, as the sea-water cannot readily penetrate the concrete, and the exhausted water cannot therefore be rapidly replaced by fresh supplies, that is to say, so long as the action of the sea is confined to the surface of the concrete, the dissolving action of sea-water may be neglected. But it is evidently of great importance that the concrete should be as water-tight as possible, and for this purpose the quantity of sand, and, as a consequence, the quantity of cement, employed must be ample. I suggest as a proper proportion three measures of broken stone or gravel to two of sand and one of cement, to which, after the mixture of the rest, one measure of large rough rubble may be added. But the subject is one for experiment with the sand and stone actually employed.

17. I am afraid that it may be considered that I have treated my instructions somewhat more broadly, and consequently at greater length than they actually required. My apology for so doing is that I have thought that it might be convenient to the authorities in India that, having

been appointed Consulting Engineer to the harbour, I should let them know as early as possible the general drift of my views on breakwater construction in general, and on Madras Harbour in particular; but I claim the privilege of modifying my proposals if on a fuller acquaintance with my subject I see reason to do so.

P.S.—The Colombo breakwater, like the Madras, is founded on a rubble substructure and generally 20 feet below low water, and is carried up to 12 feet above high water, with a concrete capping about 6 feet thick. The tidal range is trifling. The Marmagoa breakwater is founded on a rubble construction 18 feet below low water, and carried up to 7 feet above high water, the tidal range being 7 feet.—A.M.R.

Order—dated 1st July 1889, No. 1737 W., Public Works.

Communicated, with reference to G.O., No. 622 W., dated 2nd March 1889, to the Harbour Trust Board for an early expression of their views.

(True Extract.)

(Sigued) R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Ag. Joint Secy. to Govt., P.W.D.

To the Chairman, Harbour Trust Board, with plan.
" Marine Department.

Encl. J. Henriques.
Spare Copies

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BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1889} Madras.

PUBLIC WORKS.

Dated July, 1st.

Recd. *Encl.*

G.O., 1st July 1889, No. 1737 W.

JULY.

Madras Harbour

Despatch from the Secretary of State for India communicating preliminary report by Sir Alexander Rendel, K.C.I.E., with regard to the reconstruction of the — and the position of the entrance, and desiring that the views of the Government may be reported to the Government of India, communicated to the Harbour Trust Board for expression of their views.

2193

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

READ—the following papers :—

Despatch from the Right Honorable Lord CROSS, Her Majesty's Secretary of State for India, to His Excellency the Right Honorable the Governor in Council, Fort St. George, dated India office, London, 20th June 1889, No. 8 (Public Works).

Telegram from Madras, dated 5th June 1889.

Your Public Works despatch of 24th January last, para. 3. Abutment blocks ready middle of July, and north pier will be ready 18th June. Is abutment to be built? If so, telegraph the one word "yes."

Telegram to Madras, dated 7th June 1889.

Your telegram of 5th June. Yes, provided progress of north breakwater is not delayed thereby, not otherwise.

In reply to your Excellency's telegram of the 5th June, inquiring whether the proposed abutment in the north pier of Madras Harbour should be constructed, I caused the telegram noted in the margin to be despatched on the 7th instant.

2. I now forward copy of a report on the subject by Sir A. Rendel, whose suggestion, that the abutment might be moved nearer to the end of the north pier, may be adopted if considered desirable.

ENCLOSURE.

Copy report by Sir A. M. RENDEL, dated 7th June 1889.

The point of this telegram seems to be that the north breakwater will have arrived at the position in which Mr. Parkes placed his abutment on the 18th of June, that the abutment blocks will not be ready till the middle of July, and therefore that if the abutment is built the progress of the north breakwater must be delayed a month.

2. I attach no great importance to the abutment. But if it can be built without delaying the work, I think it would be well to build it. It will form part of the north breakwater if the eastern entrance be maintained, and may help towards the construction of a north-eastern entrance if such an entrance be ultimately decided on. I think the answer to the telegram might run thus :—

"Yes, provided progress of north breakwater is not delayed, not otherwise;"

and that the telegram should be followed by a letter suggesting that the position of the abutment might be shifted nearer to the end of the north pier for a length equal to the length of breakwater constructed between the 18th of June and the middle of July.

From Sir RICHARD BARLOW, *Bart.*, C.S., Chairman, Harbour Trust Board, to the Chief Secretary to Government, dated Madras, 27th June 1889, No. 2287.

I have the honor to acknowledge the receipt of G.O., No. 1583 W., dated 17th instant, which was considered by the Trustees at their last meeting, and submit herewith, for the information of Government, copy of resolution then passed thereon.

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2. As the Right Honorable the Secretary of State directs that the abutment is to be placed in the north arm of the harbour, provided progress is not delayed thereby, *not otherwise*, and as doing so would very materially delay the construction of the north breakwater, the Trustees have instructed their Engineer to proceed with the north arm upon the sanctioned design, omitting the abutment.

Enclosure.

Extract of Proceedings of the Trustees of the Harbour of Madras, at a meeting held at the offices of the Board on Tuesday the 25th day of June 1889.

* * * * *

2. Read letter from the Board's Engineer, No. 351, dated 20th instant, stating, in reference to G.O., No. 1583 W., dated 17th June 1889, communicating telegram from the Right Honorable the Secretary of State for India, dated 9th idem, that placing the abutment blocks in the north wall of the harbour, as proposed by the late Mr. Parkes, will cause delay in construction.

Read minute by Captain W. L. C. Baddeley, R.E.

The Board's Engineer, Mr. A. Lee Pogson, being present, explained details of construction and delay.

Resolved unanimously that, as the construction of an abutment on the lines suggested by the late Mr. Parkes will cause a delay of at least one and a half months on the work at the north arm and reduce the anticipated advance of this arm during the present working season by 116 feet, the north arm be continued according to the sanctioned design.

* * * * *

(True Extract.)

(Signed) C. PINSENT,
Secretary, Harbour Trust Board.

Transferred to the Public Works Department.

Ootacamund,
4th July 1889.

(Signed) W. S. MEYER,
Asst. Secretary.

Telegram from the Secretary to Government, Public Works Department, to the Chairman, Harbour Trust Board, dated 8th July 1889, No. 481 D.

Your letter 2287, dated 27th June. Report by wire length of north pier arm already built, and explain how there will be delay of one and half month.

Telegram from the Chairman, Harbour Trust Board, to the Secretary to Government, Public Works Department, dated 9th July 1889.

North arm built 2,862 feet. Delay due to abutment requiring 38 working days to build, while about 150 feet of wall could be built with ordinary blocks in same time.

Telegram from the Secretary to Government, Public Works Department, to the Chairman, Harbour Trust Board, dated 12th July 1889, No. 509 D.

Your telegram 9th. Abutment should be put in at point now reached by north arm, viz., 2,862 feet.

Telegram from the Chairman, Harbour Trust Board, to the Secretary to Government, Public Works Department, dated 12th July 1889.

Work stopped. North arm abutment blocks ready, but sea too rough to set them. Rendel's report makes it clear that the abutment will never be required. If insisted on

it will delay work seriously and make a weak place in the wall just where it should be strongest in section.

From Sir RICHARD BARLOW, *Bart.*, C.S., Chairman, Harbour Trust Board, to the Chief Secretary to Government, dated Madras, 10th July 1889, No. 2456.

I have the honor to acknowledge receipt of telegram, dated 8th instant, in reference to the abutment which it was proposed to place in the north arm of the harbour, and to forward copy of telegram, in reply thereto, despatched last night, together with copy of the Board's resolution approving the same, passed at their meeting last evening.

Enclosure.

Extract of Proceedings of the Trustees of the Harbour of Madras, at a meeting held at the offices of the Board on Tuesday the 9th day of July 1889.

* * * * *

6. Read telegram, dated Ootacamund, 8th instant, from the Secretary to Government, Public Works Department, inquiring the length of north pier arm already built and reason of anticipated delay, should the suggested abutment be placed in the wall.

Read letter from the Board's Engineer, No. 419, of this date, giving the required information.

Resolved that the following reply be telegraphed to Government:—

"North arm built 2,862 feet. Delay due to abutment requiring 38 working days to build, while about 150 feet of wall could be built with ordinary blocks in same time."

* * * * *

(True Extract.)

(Signed) C. PINSENT,
Secretary Harbour Trust Board.

Transferred to the Public Works Department.

(Signed) W. S. MEYER,
Asst. Secretary.

15th July 1889.

Order—dated 24th July 1889, No. 1995 W., Public Works.

In his report to the Secretary of State of the 7th June 1889, recorded above, the Consulting Engineer says that if the abutment can be built without delaying the work, it would be well to build it. He suggests that the position of the abutment should be shifted nearer to the end of the north pier for a length equal to the length of breakwater constructed between the 18th June and the middle of July.

2. The point at which, according to Mr. Parkes' plan, the abutment should be put in is 2,859·5 feet, while that now reached is 2,862 feet. The north arm is therefore just about advanced to the right point, and as the abutment blocks would have been ready on the 15th July (three months being allowed them to "set"), the Harbour Trust Board were directed by telegram, dated 12th July, to put in the abutment at the point then reached, viz., 2,862 feet.

3. In his telegram of the 12th July, the Chairman points out that if the abutment is insisted on it will delay work seriously and make a weak place in the wall.

4. The Government is not prepared to admit the force of these objections in the face of the recommendation of the Consulting Engineer to the India office, who has advised the construction of the abutment if the progress of the north pier is not stopped owing to the blocks not being ready. This is not the case, and as the Secre-

tary of State has ordered that the abutment shall be put in, His Excellency the Governor in Council must insist on the orders already communicated to the Harbour Trust Board by telegram of the 12th July, recorded above, being complied with.

5. Ordered that the following telegram be despatched :—

"To the Chairman, Harbour Trust Board.

"My telegram, 12th July, ordering abutment to be put in at 2,862 feet, is confirmed. Orders follow."

(True Extract.)

(Signed) R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Ag. Joint Secy. to Govt., P.W.D.

To the Chairman, Madras Harbour Trust Board.
" Marine Department.

Exd. J. Henricus.
Spare Copies

24 Oct

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BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1889} Madras.

PUBLIC WORKS.

Dated July, 24th.

Recd.

Encl.

G.O., 24th July 1889, No. 1995 W.

JULY.

Abutment in the North Pier of Madras Harbour

Passing orders on despatch from the Secretary of State for India forwarding copy of a report by Sir A. Rendel on the proposed —.

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GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

READ—the following despatch from the Right Honorable Viscount CROSS, Her Majesty's Secretary of State for India, to His Excellency the Right Honorable the Governor in Council, Fort St. George, dated India Office, London, 15th December 1887, No. 11, Public Works:—

Madras Harbour Works. Remarks by Mr. Parkes on Report of Harbour Committee.

With reference to my Public Works letter No. 10, dated 24th ultimo, which forwarded, for your Excellency's information, copies of the report which has been presented by the committee appointed to consider the best position for the entrance to Madras Harbour, I now transmit copy of a letter which has been received from Mr. Parkes, the Consulting Engineer for the Harbour, containing his remarks on the conclusions of the committee.

2. Of the four designs which were laid before the committee by the late Captain Taylor, as representative of the Harbour Trust Board, the committee, for the reasons stated in their report, have recommended the adoption of No. III. Mr. Parkes, for engineering and other reasons, strongly urges the adoption of a design similar to No. I. The comparative merits of these designs are sufficiently discussed in Mr. Parkes' letter and in the minutes of evidence taken before the committee, of which copies are now forwarded for your Excellency's information.

3. Before coming to a final decision on the course which should be adopted on the recommendations of the committee, I desire to have the benefit of your Excellency's opinion in Council after obtaining the views of the Harbour Board on the whole subject.

ENCLOSURE.

From W. PARKES, Esq., to the Under Secretary of State for India, dated 23, Abingdon Street, 25th November 1887.

In compliance with the request contained in your letter of the 22nd instant, No. P.W. 2070, I have the honor to submit the following remarks on the report of the committee appointed to consider the above question.

2. It is desirable that I should at the outset explain my position with regard to this question. I have never taken a prominent part in its discussion. When it was originally raised in 1882, shortly after the destructive storm of November 1881, I recommended that a decision upon it should be deferred till the works of restoration had made some progress. When, in 1883, Sir John Hawkshaw's committee, in their first report, expressed an opinion unfavorable to the change of entrance, I ventured to recommend that this decision should not be accepted as final (see my report to the Government of Madras, dated 9th March 1882, paragraphs 44 and 45, and that to the India Office, dated 10th February 1883, paragraph 14).

3. The committee appointed by the Government of Madras, however, on the 30th April 1883, were not satisfied to leave the question in this state, but in their report, dated 20th June, forced an immediate decision by presenting an independent scheme of reconstruction, of which a north-east entrance was an essential feature. This scheme was referred to Sir John Hawkshaw's committee, and by them emphatically condemned. This decision was accepted as final by the Secretary of State, and I felt that the discussion of the question ought then to be considered as exhausted, and that my duty was to show how the admitted evils of the sanctioned eastern entrance could be best met by other arrangements. To this I devoted a large portion of my

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report of 21st August 1884 (from paragraph 60 to the end), and to the further development of this I have since devoted much time and consideration.

4. It is right I should mention that while I disclaim any responsibility in this final decision in favor of the eastern entrance, I entirely acquiesced in it as the best under the circumstances, though had my opinion been officially asked I should have been disposed to say more about the views and arguments of the nautical men locally consulted than was said in the report of Sir John Hawkshaw's committee.

5. From the above it will be seen that there is nothing in my past attitude in regard to this question to prevent my acquiescence in the adoption of a north-east entrance, if such reason is shown for it as will place the decision on a logical basis, even though I might have to yield something of my own estimate of the balance of argument on a question on which there is admittedly much to be said on both sides; but I think it my duty, holding the position I do, to give what assistance I can to enable the Secretary of State to decide whether an order based on the recommendations of the present committee can be considered as final and unassailable.

6. With this view I have given careful and critical examination to the evidence and to the committee's report, and I am bound to say that, in my opinion, the adoption of that report as a basis for further action will not relieve the undertaking of the difficulties under which it is at present laboring, but will rather tend to introduce new ones.

7. I do not propose to criticise the report in detail, but, in justification of the opinion above expressed, I would beg to direct attention to three points suggested by a study of the report:—

1*st*. The introduction of a question of far greater importance than that of the entrance, which, if solved in the direction indicated by the committee, would render the further discussion of the entrance question quite superfluous.

2*nd*. Its incompleteness as an authoritative basis for the action of Government.

3*rd*. A recommendation in a matter which, from the committee's point of view, is one of secondary importance, but from my point of view of primary importance, and to which, in my capacity of responsible Engineer of the works, I think it is within the scope of my authority to take exception.

8. The first question of importance above alluded to is set forth in the second paragraph in page 2 of the report. It is that—

"So rapid and regular is the encroachment of the sand on the south side, that, if continued at the same rate, which we have strong reason to apprehend will be the case, within 20 years the depth of water at the south-east corner will be reduced to four fathoms."

This apprehension is used as an argument against the formation of an entrance at the south-east corner, a proposal which has never been seriously entertained on account of the fact that the sand is advancing on that side of the harbour, but it is now for the first time introduced as it is in the committee's next paragraph as an argument against the eastern opening, though no reference is made to its causing any difficulty at the site of the north-east opening.

9. Now I submit that if this apprehension of the committee is to be taken as a ground for future action, it must be taken with all its necessary consequences. Those consequences are that within 20 years, that is, within the lifetime of the majority of the persons now employed in or about the harbour, the navigable depth of the south-east corner will be lost, that "at a time not very far distant" it will be lost at the middle of the sea face of the harbour, and by an inevitable continuance of the same process the site of the proposed north-east entrance will be subject to the same destructive action. Thus the present generation will witness the gradual absorption of the harbour in a mass of sand and the reduction of the advantages of Madras as a trading port to something far inferior to what they were before the harbour works were commenced.

10. It will be easily supposed that, when such a prospect as this was suggested to me, I lost no time in looking carefully to the grounds of my own very different conclusion. I am happy to say that the result has been the confirming and strengthening of that conclusion, and I think I may confidently add the detection of the fallacy on which the anticipation of the committee is based.

11. I would beg to explain in as few words as I can what is the conclusion which has been thus questioned. When my original proposal for a harbour at Madras was first put forward, objections were made to it in several influential quarters on the ground of its interference with the movement, and the consequent accumulation, of sand. This question was specially referred to Mr. Bateman, who was consulted by the Secretary of State before the scheme was sanctioned in 1875. Mr. Bateman's opinion was that the injurious accumulation of sand would take so long that it might be disregarded.

12. The first year's work caused what appeared to be a formidable accumulation, and the question was again raised and fully discussed, with the result that the Government was reassured. A calculation was made showing that the accumulation in one south-west monsoon occupied about one-fiftieth of the space available for arresting the sand, thus giving 50 years as the minimum

life of the harbour, without making any allowance for the opposite movement in the north-east monsoon, which was known to be considerable, but which could not then be definitely determined. Fifty years, therefore, with a considerable, but not at that time accurately determinable, addition was taken as approximately the time during which no measures need be taken to protect the harbour from sand.

13. Even after this the question was from time to time raised and discussed, but one objector after another dropped off, and since 1879 the question has been absolutely at rest.

14. In the meantime the movements of sand have been carefully watched, recorded, and reported on, so that if any one were disposed to object, the data were always at hand on which to base any adverse theory. But no one has come forward, and, on the contrary, the accumulation of facts has been such as to confirm in the most complete manner the correctness of our original anticipations. Each year shows a slight advance of beach, and the advance from year to year is so regular, though proceeding at a decreasing rate, as to show that the accretion is not the result of casual and variable storms, but of some regularly recurring seasonal action. The oblique stroke of the light but continuous surf on the beach is generally acknowledged as a sufficient cause for the results seen and recorded.

15. A position thus built up by the confirmatory experience of 10 years has a strong presumption in its favor. It may be based on a fallacy, but I submit it deserves to be attacked, if it is to be attacked at all, by some well-defined alternative theory. For such I have been looking anxiously since I first heard the committee were not satisfied with my position, but all I have got as a result is the vague statement of their apprehensions quoted in paragraph 8.

16. This statement is based on certain figures from which the committee and myself draw very different conclusions. In May 1886 there was a heavy cyclone sea which produced certain exceptional results, the shore line was considerably washed back, and there was a considerable accretion of sand at two, three, and four fathoms under water.

17. The committee examining the latter alone came to the conclusion that it did not bear out my contention that the advance proceeds in a decreasing annual ratio, but the contrary, and they show that if it continues at the same rate in future as in the last four years, the four-fathom line will reach the south-east corner of the harbour in 15½ years. This period is increased in their report to 20 years, though upon what grounds does not appear.

18. My deduction from the same data, but including with them the upper parts of the slope which were washed back, is that the rate of advance is decreasing, and that the measurements as a whole show that the disturbance of the storm of May did not result in any addition to the normal year's accumulation, but simply redistributed it by drawing down sand from the shore. Thus, my original calculation of 50 years as the *minimum* estimate of the life of the harbour is in no way affected, but the measurements show that the originally indeterminable addition to the 50 years may be taken to be at least 10 years, so that there is half a century to run from the present time. I think it unnecessary at present to cite further figures, but I may say that, if a further investigation were required, these would be forthcoming, and would confirm in a remarkable way my general conclusion.

19. I should add that the difference between the committee and myself is not limited to the question of 20 or 50 years. There is another point of almost equal importance. I contend that it is now well established how the sand comes, and in what quantities it comes, and therefore how it may be intercepted when it becomes necessary, and what the cost of intercepting it will be. It may be added that that cost, which will not be required for 50 years, will not thenceforward be a serious burden on the trade. On the committee's supposition there is no such knowledge. If the sand is conveyed by currents (which, though not suggested by the committee, is the only other conceivable vehicle for its transport) it is impossible to say how or where it will be deposited, or whether it can be in any way controlled.

20. I have now shown how very different are the conclusions drawn by the committee and myself from the same data. I hope I have also shown to the satisfaction of the Government that my conclusions are not of a character to be set aside in favor of such a vague suggestion as that put forward by the committee. But if the case ended here I should hardly feel justified in asking that the committee's suggestion should be set aside in favor of my conclusion. I could only ask that a decision should be postponed pending a reference to further experience. Meanwhile a continuance of the present heavy rate of expenditure on the works would be hardly justifiable.

21. But since the committee ceased their sittings, after the members had left town, and while the report was in circulation for signature, information has reached me which I think has brought the question to a practical test. A survey was made in September 1887 which shows the exact position of the four-fathom contour at that date. It will be remembered that the committee's apprehension was that this would continue to advance at the same rate as in the four years previous to 1886. I contended that the advance in 1886 was exceptional and raised the average abnormally. I expressed my belief that future years would show, not a retreat, but a retarded rate of advance till the average normal annual rate was restored.

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22. The following are the facts shown by the recent survey. On the line of section 300 feet south of the pier the average annual advance between 1882 and 1886, and which the committee expected to continue, was 120 feet. From 1886 to 1887 the actual advance was, however, 10 feet.

On the line of section 550 feet south of the pier the anticipated advance was 96 feet, the actual 35 feet.

At 950 from the pier the anticipated advance was 78 feet, the actual 30 feet.

At 1,350 from the pier the anticipated advance was 65 feet, the actual 70 feet.

The fifth section was not repeated, but this as well as the fourth, and to some extent the third, had shown in 1886 much less exceptional disturbance than those nearer the pier.

23. Now, in view of these facts, I think I may go a step further than I should have ventured to do before the receipt of this information, and ask that this suggestion of the committee should be dismissed as a groundless scare.

24. I now proceed to the second point named in paragraph 7, viz., "The incompleteness of the committee's decision as an authoritative basis for the action of Government." On this point I need hardly explain that I do not claim to have any voice except as contributing information necessary to enable the Secretary of State to form a decision.

25. I would remark that there is this peculiarity in the subject referred to the committee. An authoritative decision upon it, fully endorsed by the Secretary of State, is already in existence. Since that decision was given, 3½ years ago, there has not arisen any new evidence on matters of fact, nor has any new question been introduced by the committee themselves, and not by any of the witnesses sand, which has been introduced except that of the advance of the on one side or the other. This question, as I have shown, is of far greater importance than the question of entrance. It must be dealt with independently of the latter, and in one of the three following ways, each of which will suggest its own consequences. If the committee's view of the said question is to be accepted as proved, I can see no other course than to at once abandon, and close the accounts of, a most unfortunate and ill-advised undertaking. If the question is to be reserved for the test of further experience, further outlay should be suspended till time has solved it. If it be at once and finally rejected, as I think I have shown may be safely done, then the effects of its removal from the committee's balance of argument must be considered.

26. Taking the last alternative, it is to be observed that the point is introduced by the committee simply as an argument in favor of the north-east entrance. But there is nothing to show what weight they give to this argument, and whether its removal will transfer the balance to the other side. If it did so, of course, the decision as now pronounced would be null and void. If it did not, then we should have two co-existent but conflicting judgments, based upon the same evidence, one pronounced by Sir John Hawkshaw, Sir John Coode, and Professor Stokes, the other by Admiral Salmon, Sir John Coode, and Sir George Nares.

27. This somewhat peculiar position derives importance from a fact which has been brought to light by this inquiry. I have said that the evidence as to matters of *opinion* there is a marked contrast between the two committees. In the earlier case the nautical evidence was represented to be unanimous in favor of the north-east entrance. This alleged unanimity no doubt had great weight as an argument with the Harbour Trust Board, with the Government of Madras, and with the Government of India, but it is an argument which no longer exists. The unanimity has completely broken up, and it is now shown that nautical opinion is very much divided on the subject.

28. Under these circumstances, is it certain that the present strong feeling in favor of the north-east entrance will be permanent at Madras? The immediate or proximate successor of the late Captain Taylor may be an advocate of the eastern entrance. The Harbour Trust Board is a changing body. The financial view of the question, as yet hardly presented, will open a prospect of an addition of 40 or 50 per cent. to the harbour dues. May not these considerations, and I can imagine others to support them, give rise to an urgent demand for an appeal from Admiral Salmon's committee, which would be supported by the precedent of the appeal granted from Sir John Hawkshaw's committee?

29. I now pass to the third point named in paragraph 7, as to "a recommendation in a matter which from the committee's point of view is one of secondary importance, but from my point of view may be of primary importance, and to which, in my capacity of responsible Engineer of the works, I think it is within the scope of my authority to take exception." I fear it will be considered that what I have already said has rather enhanced than otherwise the difficulties of the situation. I hope that what I have now to say may do something to suggest a solution, though unfortunately I have to begin by again joining issue with the committee.

30. When I was before the committee on the 29th June, several schemes for a north-east entrance were shown to me, and my opinion upon them was asked. I was informed that the choice was virtually limited to two, which I will call A and B. Having previously seen and considered these I was able to speak definitely, and I gave the preference, for reasons adduced, very decidedly to plan A. There was much general discussion of the matter, and I left the room with the strong impression that the members of the committee were equally in favor of plan A.

31. Several weeks afterwards I was requested to furnish estimates of these two schemes, and finding that my anticipation that the cost of plan B would be considerably greater than that of plan A was fully confirmed, the difference being nearly 5 lakhs of rupees, and remembering the impression made upon me that the committee were fully alive to the other objections to plan B, which had been fully discussed, I did not think it necessary to repeat these in writing, and furnished simply the estimates in abstract.

32. It was therefore with considerable surprise that I afterwards found that the committee had adopted plan B, with all its objections, as their final recommendation, and make no allusion in their report to plan A. My objections to plan B are, of course, mainly on engineering grounds, and these might be outweighed by any considerable superiority on nautical grounds, but it is a case in which it is impossible that such considerable superiority can exist. I cannot admit that even the engineering member of the committee can be so good a judge as myself of the relative difficulties of carrying out the two schemes, and I submit that it is a matter of detail in which the committee's recommendation may be amended so as to make it conform to my views. I do not now trouble you with the details of my objections, but I shall be ready to furnish them if required.

33. What I have now to say is dependent upon the substitution of plan A for plan B. The estimated cost of plan A (in addition to the sanctioned estimate) is Rs. 18,11,411, with an overlap of 600 feet, or of Rs. 20,86,677, with an overlap of 800 feet. This is supposing that its adoption is decided on before the work proceeds any further. I find that if the work were allowed to proceed upon the sanctioned plan till each pier is built to within about 300 feet of its termination, and the formation of a north-east entrance according to plan A were then ordered, the ultimate extra cost would be something under a half a lakh of rupees, say 18½ lakhs or 21¼ lakhs.

34. If this were done the harbour would be virtually restored to the state in which it was previous to the storm of November 1881, for the last 300 feet of each pier are standing in a state to give effectual shelter, and the question of a change of entrance might then be reconsidered in view of the actual effect of the piers as originally designed. The trade would then have the benefit, such as it is, of such a harbour in a virtually complete state pending the construction of the new entrance. To carry out the work to that extent would take about eighteen months, during every month of which time the shelter would be improving. To proceed on the plan recommended by the committee, the first two or three years would be spent in opening the harbour still more to the sea, and that in the most dangerous possible form, while a further three years would be occupied before anything like efficient shelter would be obtained.

35. In conclusion, I would beg to call attention to one point which has not been mentioned by the committee. The committee have stated very fairly how various admitted evils would be cured by the construction of the north-east entrance. For these evils Captain Taylor and others only allow the possibility of one remedy. It should be borne in mind, however, that many of them can be cured by other and less costly remedies, as I have previously shown. Credit should be taken for these on the side of the eastern entrance without necessarily assuming that they will place the whole balance of advantages in its favor.

Order—dated 16th January 1888, No. 153 W., Public Works.

Communicated, in continuation of G.O., No. 3484 W., dated 20th December 1887, to the Chairman for an expression of opinion by the Harbour Trust Board.

(True Extract.)

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

To the Chairman, Harbour Trust Board, with one plan and copy of report.
" Marine Department.

Exd. J. Moses.
Spare Copies

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BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1888} Madras.

PUBLIC WORKS.

Dated January, 16th.

Recd. *Encl.*

G.O., 16th Jan. 1888, No. 153 W.

JANUARY.

Madras Harbour Entrance

Communicating to the Chairman, for an expression of opinion by the Harbour Trust Board, despatch from the Secretary of State forwarding a letter from Mr. Parkes containing his remarks on the conclusions of the London Committee on the question of the—.

PUBLIC WORKS SECRETARIAT
GOVERNMENT OF MADRAS

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

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Buildings and Roads.
Civil Works.

Read—the following papers:—

G.O., dated 25th April 1888, No. 151, Marine.

Read—the following letter from R. W. BARLOW, Esq., C.S., Chairman, Harbour Trust Board, to the Chief Secretary to Government, dated Madras, 6th April 1888, No. 69:—

I have the honor to acknowledge the receipt of G.O. No. 153 W., dated 16th January 1888, forwarding a letter from Mr. Parkes addressed to the Under-Secretary of State for India, dated 25th November 1887, and to submit, for the information of Government, an extract of the Proceedings of the Harbour Trust Board at their meeting of 2nd March, confirmed at the meeting of the 8th idem.

2. The question of the position of the entrance has been most carefully considered and very fully discussed; and while the trustees "adhere to their former resolution as to the necessity of a north-east entrance, and (with one dissentient) prefer plan No. III, approved by the London committee, subject to any modifications that may be proved necessary hereafter," they are unanimously of opinion that *smooth* water is absolutely necessary to make the harbour a success, as without it very little practical progress can be made in the improvement of means for conducting landing and shipping operations, inasmuch as with an eastern entrance all improvements effected, in the way of providing large iron lighters, low level wharfage, &c., are liable to be wrecked by the free entrance of the heavy rollers accompanying each succeeding cyclone, or very heavy weather.

3. The Board do not think the harbour can be looked upon as a harbour of refuge from a cyclone, until experience has proved it such, and, at present, are of opinion that no ship would attempt to enter the harbour for shelter or, if inside, remain on the approach of or during a cyclone, if it should be at all practicable to put to sea beforehand; that, during the prevalence of such a storm, it may be taken for granted all shipping operations would be suspended; and that on its approach all vessels would put to sea and return when the weather had moderated.

4. It is absolutely essential, in the opinion of the trust, to the future prosperity of this port, that ships so returning should find lighters and machinery for loading or landing cargo, ready to go to work at once; and lighters and jetties, with cranes erected thereon, must depend for safety upon the smoothness of the water in the harbour. An eastern entrance will never give *smooth* water during at all heavy weather, and though a boat harbour, as proposed by Mr. Parkes, would secure the lighters, it would leave jetties and wharves in the harbour, with the cranes thereon, unprotected and exposed to certain destruction.

5. Referring to the three points dealt with by Mr. Parkes in his letter, the trustees would remark, with regard (*a*) to the question of the advance of the sand to the south of the harbour, that had the committee been in possession of the information referred to by Mr. Parkes in para. 22, they would probably never have alluded to the subject. The advance of sand to the south of the southern arm of the harbour is, the Board consider, a matter of no present practical importance, and has nothing whatever to do with the question, whether the best position for the entrance is east or north-east.

6. In reference (*b*) to the second point raised by Mr. Parkes, the Board unanimously approve the decision of Admirals Salmon and Nares and of Sir John Coode, and, as there are "two co-existing but conflicting judgments based upon the same evidence," would strongly urge their right to act upon the one which coincides with

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their own unanimous views. It is in their opinion a most difficult task for gentlemen at a distance, who may never have seen this port in a cyclone, and are totally unacquainted with its business, routine, and requirements, to form a judgment. The Board would most emphatically urge that they are in every way best qualified to *know* what is wanted, altogether independent of a mass of conflicting testimony, which is all the gentlemen forming the various committees at a distance have to guide them.

7. Referring (*c*) to Mr. Parkes's third point, the Board agree with him in para. 29 that he had perhaps "rather enhanced than otherwise the difficulties of the situation;" they *prefer* plan No. III, but what they *want* is *smooth water*, ensuring safety to landing and shipping appliances in heavy weather. Any modification of plan III or IV or any plan which will give them *this*, within a reasonable time, at a cost which the port can afford to pay, is all they have contended for as being absolutely necessary, and upon the absolute necessity of *smooth water* they do most strongly insist.

8. The Board do not approve of Mr. Parkes's modification "A," which presents the objectionable re-entering curve to the full force of a cyclone swell, immediately to seaward of a proposed entrance, and they understand that this is an objection previously insisted upon by all engineers who have been consulted.

9. The question of an alternative scheme brings me to the financial position and revised estimates.

10. Mr. Parkes estimates the extra cost of his new proposal, above sanctioned estimate, with 600 feet overlap, at Rs. 18½ lakhs, and with 800 feet, Rs. 21¼ lakhs (para. 33).

On referring the question to their Engineer, Mr. Thorowgood, he estimates the probable extra cost *for Mr. Parkes's plan A*, at Rs. 24,75,976 and Rs. 21,[illegible] respectively.

11. *For plan III* Mr. Thorowgood estimates the extra cost to be Rs. 27,70,103 and Rs. 30,08,363 for 600 and 800 feet overlap, respectively.

12. In estimating their financial position the trustees prefer to take their own engineer's estimate made on the spot, and, in round figures, the result would be as follows, upon the date when it is anticipated that the works will be complete:—

	600 *feet Overlap.*						Rs.
Sanctioned estimate ...	...	...	...	...	...	...	46,55,000
Add extra for plan III	...	...	...	...	...	...	27,70,000
							74,25,000
Deduct—							
Advances refunded—							
1886-87, 1887-88 ...							
1889, 1894	...	...	...	...	...	...	2
			...	...	...	...	6
							8,00,000
Capital advances outstanding, 1894-95			...	...	...	...	66,25,000
Interest thereon, at 4½ per cent.	...	...	...	...	...	...	* 2,98,125
Annual refund of loan			...	...	...	...	1,00,000
Amount payable to Government	...	...	...	...	...	...	3,98,125
Income—							
Revenue account			...	...	...	...	3,00,000
Port dues levied under Acts XII of 1875 and IV of 1881						...	1,20,000
Surplus of pilotage fees ...	...	...	...	...	...	...	12,000
Warehouse charges ...	...	...	...	...	...	...	20,000
							4,52,000
Deduct amount payable to Government as above ...				...	...	...	3,98,000
Balance to credit of trust	...	...	...	...	...	...	54,000

* Decreasing annually by Rs. 4,500, the interest at 4½ per cent. upon one lakh of rupees.

	800 *feet Overlap.*						Rs.
Sanctioned estimate ...	...	...	...	...	...	...	46,55,000
Add extra for plan III	...	...	...	...	...	...	30,08,000
							76,63,000
Deduct—							
Advances refunded as above			...	...	...	...	8,00,000
Capital advances outstanding, 1894-95			...	...	...	...	68,63,000
Interest thereon, at 4½ per cent.	...	...	...	...	...	...	* 3,08,800
Sinking fund			...	...	...	...	1,00,000
							4,08,800
Income as above			...	...	...	...	4,52,000
Balance to credit of the trust	...	...	...	...	...	...	43,200

13. In framing the above estimate the calculations have been based on actuals of previous years; the revenue from port dues is shown at Rs. 1,20,000 only, that being the amount shown in para. 11 of G.O. No. 15, dated 17th January 1888, after allowing for the reduction of Annas 1-6 per ton on liners, recommended by the Board in my letter No. 6974, dated 5th March 1888. The surplus of pilotage fees is taken from the actuals of 1886-87, Rs. 12,467. With regard to the item, Rs. 20,000 warehouse charges, the Board propose to supply, as soon as possible, a want very much felt in Madras by erecting warehouses and storing goods therein under warrant, in the same manner as is done in Bombay, where the Port Trust received in 1880-81, when the system was first introduced, *Rs. 30,716-6-1*, which in 1884-85 had risen to Rs. 97,280-15-3, or deducting cooly-hire, to about Rs. 85,000 net. The Board are of opinion that at least Rs. 20,000 might be raised from this source increasing annually.

14. Another source from which a large income might be derived is by saving in *boat-hire*, provided smooth water can be relied on in the harbour; this is now fully Re. 1 per ton all round, the total tonnage handled yearly being between 2½ and 3 lakhs of tons. Taking the lower figure to allow for timber floated on shore, and calculating a saving of 12 annas per ton in boat-hire charges as practicable with smooth water, an additional revenue of Rs. 1,87,000 could be levied, as enhanced harbour dues, without imposing any additional tax on the trade of the port; and this sum, with the surplus shown above, is more than sufficient to meet all current charges, including petty construction. The reason why boat-hire is so excessively high at Madras is the insecurity of the investment in lighters, which are liable to be smashed to pieces at any moment, and which, under ordinary circumstances, soon become unserviceable, through constantly beating up against each other, against ships' sides, and against the piles of the pier Iron lighters carrying 100 tons each could, with smooth water, be safely maintained in the harbour, and loaded beforehand against the arrival of a steamer, thereby economising time. A charge for boat-hire of only 4 annas a ton, yielding Rs. 25 per trip, would be, if anything, too high, and more than would be needed to pay a handsome return upon a comparatively secure investment. But the Board do not wish, if it can be avoided, to enhance harbour dues, when smooth water renders a reduction in boat-hire practicable, one of the chief objects of the harbour being not only to facilitate but to cheapen landing and shipping operations, and they would prefer to allow the trade of the port to benefit, as much as circumstances will permit, by any reduction which may be found practicable hereafter. It would probably be sufficient at first to divide the saving effected between the Board and the merchants concerned.

15. I am further requested by the Board to ask that Government will suggest to the Right Honorable the Secretary of State that the rate of interest upon capital advances might be reduced from 4½ to 4 per cent. per annum, which would be of material assistance to the trade of the port.

* Decreasing annually by Rs. 4,500, the interest at 4½ per cent. upon one lakh of rupees.

16. In conclusion, I am desired by the Board to urge upon Government that the Board consider that Mr. Parkes is not sufficiently acquainted with this port to enable him to form a correct opinion of its requirements, and the result of carrying his theories into practice has already been far from satisfactory.

17. The Board have on the spot a staff of engineers who for many years have had the advantage of an intimate practical acquaintance with the harbour which, in its present condition, admits of completion within only very narrow limits of design, and the Board would earnestly represent that all details in reference thereto should be settled on the spot by themselves, subject to the control of the Madras Government, who can instruct their engineers to inquire into and examine any deviation from the sanctioned plan which it might be considered, in the interests of the port, to adopt. This would obviate the delays which have occurred hitherto through constant references to England.

18. The Board are quite willing to subordinate their wishes to engineering control, but would most strongly urge that this control should be in the hands of the Madras Government, and if any proposals which might be made were approved by Government, the Board respectfully submit that the Right Honorable the Secretary of State might rest assured that the matter had been carefully inquired into by competent engineering authority.

Enclosures.

Extract of Proceedings of the Trustees of the Harbour of Madras, at a meeting held at the offices of the Board on Friday the 2nd day of March 1888.

* * * *

2. Read again all papers in connection with the question of the position of the entrance to the harbour, and minutes by the Chairman, Messrs. G. L. Chambers, J. R. Hunter, Captain W. L. C. Baddeley, R.E., Captain H. A. Street and Mr. J. McLintock, and examined plans in reference thereto. Mr. Thorowgood was asked to attend, and explained to the trustees various points upon which they desired information and then withdrew.

Resolved that the trust adhere to their former resolution as to the necessity of a north-east entrance and prefer the plan No. III approved of by the London committee subject to any modifications that may be proved necessary hereafter. The Chairman is invited to submit to Government the views of the Board in regard to the despatch from the Secretary of State, dated India Office, 15th December 1888, communicated under endorsement order No. 153 W., dated 16th January 1888.

* * * *

Extract of Proceedings of the Trustees of the Harbour of Madras, at a meeting held at the offices of the Board on Friday the 23rd day of March 1888.

* * * *

2. Read draft letter from the Chairman, Harbour Trust Board, addressed to the Chief Secretary to Government, Marine Department, in reply to G.O. No. 153 W., dated 16th January 1888, communicating a despatch from the Right Honorable the Secretary of State, No. 11, dated 15th December 1887, forwarding a letter from Mr. Parkes, dated 25th November 1887, in reference to the question of the position of the entrance to the harbour.

Read minutes by Captain Street, Indian Marine, Captain W. L. C. Baddeley, R.E., Mr. Hunter, Mr Chambers and the Chairman.

Resolved that this letter, as now amended, be redrafted and circulated for further consideration.

* * * *

Extract of Proceedings of the Trustees of the Harbour of Madras, at a meeting held at the offices of the Board on Thursday the 29th day of March 1888.

* * * *

2. Read again drafted letter addressed to the Chief Secretary to Government, Marine Department, in reply to G.O. No. 153 W., dated 16th January 1888, communicating a despatch from the Right Honorable the Secretary of State, No. 11, dated 15th December 1887, forwarding

a letter from Mr. Parkes, dated 25th November 1887, in reference to the question of the position of the entrance to the harbour.

Resolved that this letter, as now amended, be approved.

* * * *

Order—dated 25th April 1888, No. 151, Marine.

Transferred to the Public Works Department with the following remarks :—

(1) According to the budget of the current year, reviewed in G.O., dated 7th March 1888, No. 215, Financial, the Board's total revenue receipts amount to Rs. 3,03,000. But this sum includes Rs. 20,000, interest on investments, which will probably have disappeared before the completion of the harbour, as the current revenue expenditure is at present considerably in excess of the receipts.* Again, the establishment and contingency charges amount, in round numbers, to Rupees 1,14,000, and the normal charges for petty construction and repair cannot be taken as less than Rs. 40,000 annually. (The amount provided under this head in the present year's budget is Rs. 95,000). The Board's surplus under harbour revenue in years to come cannot therefore, on the present sources of income, be estimated at more than Rs. 1,29,000 (Rs. 2,83,000 — Rs. 1,54,000) per annum.

* *Revenue Account.*

	Rs.
Budget-estimate for 1888-89—	
Receipts	3,03,000
Charges	4,13,000

(2) The Board have now been appointed conservators of the port under Section 8, Act XII of 1875, and this will enable them to apply the surplus port revenues under that Act to the improvement of the harbour. But it must be remembered that the Government can at any time by an executive order remove them from this position.

(3) Even assuming, however, that their position as conservators will be a permanent one, they have largely over-estimated their surplus from port dues, which they put down at Rs. 1,20,000 per annum. The total receipts of the Madras Port in 1886-87, inclusive of pilotage fees, amounted, according to the Port Officer's administration report for that year, to Rs. 1,83,527, while the charges aggregated Rs. 1,45,601. The Board will doubtless be able to effect a considerable reduction in the port establishment, and the revision of port fund accounts ordered in G.O., 17th January 1888, No. 15, will probably be favorable to Madras. But, on the other hand, the port dues on sea-going ships other than coasting steamers have just been reduced from 6 to 4½ annas a ton, and the Board estimate that this will reduce the receipts under this head by some Rs. 25,000. Allowing for all these changes, the port surplus available for harbour purposes cannot be reckoned at more than Rs. 40,000 per annum in addition to the Rs. 12,000 which the Board have taken credit for under Pilotage fees.

(4) The total surplus upon which the Board can now reckon will therefore be—

	Rs.
From Harbour revenue account	1,29,000
„ Port fund	40,000
„ Pilotage fees	12,000
„ Warehouse fees	20,000
Total ...	2,01,000

or in all about 2 lakhs of rupees, to meet payments to Government which will amount to Rs. 3,98,000 if the 600 feet overlap is adopted, or Rs. 4,08,000 upon the 800 feet overlap, leaving a deficit of Rs. 1,97,000 or Rs. 2,07,000.

(5) The Board, however, consider that the saving in boat-hire will enable the trade to pay increased harbour dues without additional burthen, and hope to realise not less than Rs. 1,87,000 per annum under this head. That amount will more than cover the ordinary charges of the Harbour Trust Board, which have been omitted in the Board's calculations, but are included above, and will nearly meet the deficit above shown. The balance remaining may jointly be met by additional warehouse fees, of which the Board have adopted a minimum estimate; or must be provided for by increasing harbour or port dues beyond the amount of the estimated saving in boat-hire. The Government are at present unable to test the correctness of these estimates,

but they note that the anticipated saving in boat-hire depends on the certainty of smooth water, and this cannot be secured until the harbour approaches completion.

(6) It is evident then that, making full allowance for the fact that the interest on the accumulated sinking fund will, as time goes on, materially diminish the net charges, the Board will sooner or latter be obliged to raise the harbour dues, or port dues, or both, in order to meet the increased liabilities which they propose to incur. Such increase, and more especially under port dues which have just been reduced, is, however, perfectly feasible, and may possibly not entail more than a temporary increased burthen on the trade. There is also a considerable, though not as yet ascertained, surplus to the credit of the Madras Port Fund, which will now be at the disposal of the Board as Conservator. On the whole, from a financial point of view, the Board's ability to repay the further advance now in question seems sufficiently established.

(7) Of course, if the Board's prayer for a reduction of the interest on capital advances from 4½ to 4 per cent. is complied with, the necessity for imposing fresh rates will be *pro tanto* diminished. The Government, in this department, consider that the request is a reasonable one, and deserves the favorable consideration of the Secretary of State.

(True Extract.)
(Signed) W. L. C. BADDELY, Capt., R.E.,
Under-Secy. to Govt., P.W.D.,
for Chief Secretary.

G.O., dated 6th March 1888, No. 764 W., Public Works.

Read—the following paper:—

From R. B. BUCKLEY, Esq., Under-Secretary to the Government of India, Public Works Department (Civil Works—Miscellaneous), to the Secretary to the Government of Madras, Public Works Department, dated Calcutta, 28th February 1888, No. 106 M.

With reference to the Secretary of State's despatches, noted in the margin, on the subject of the best position for the entrance to the Madras harbour, I am directed to forward, for His Excellency the Governor's information, copy of a Note on the subject, by Mr. Molesworth, the Consulting Engineer to the Government of India for State Railways.

Nos. 10 and 11 P.W., dated respectively the 24th November and 15th December 1887, to the address of His Excellency the Governor of Madras.

Enclosure.

Note by G. L. Molesworth, Esq., *Consulting Engineer to the Government of India for State Railways, on the subject of the Madras Harbour.*

The committee, composed of Admiral Salmon, Sir John Coode, and Sir George Nares, has now pronounced in favour of an entrance at the north-east corner of the Madras harbour, closing the present entrance to the east.

Of the four plans proposed and marked Nos. I, II, III and IV, respectively, the committee accords its preference to No. III on nautical grounds, but it does not state the nature of those grounds.

Plan No. I was originally proposed by the Madras committee in its report, dated June 20th, 1883; but when that report was referred to me by the Government of India for opinion, I pointed out in my Note of July 17th, 1883, the very serious objections to which this plan was exposed from its re-entering curve and from the action of confluent waves.

I also pointed out that plan No. II (which, in my opinion, was the necessary modification of No. I in order to remedy its defects) was open to the undoubted objection of throwing vessels, entering the harbour, further into shoal water than was desirable, and I suggested for consideration the alternative plan of extending one of the faces so as to cover the existing entrance as shown in No. IV.

In May 1887, Mr. Thorowgood submitted, for the consideration of the Madras Harbour Trust Board, plans Nos. I, II and IV, and in addition to these plans he also submitted the modification of No. IV, as shown in plan No. III.

In No. III the extension of the face is carried out with a slight change of direction, whereas in the plan I suggested, the extension was in a straight line, on the prolongation of the face.

Mr. Thorowgood, however, in putting forward plan No. III, accorded the preference to No. IV, which also found most favour with the Harbour Board for the following reasons:—

"(1*st*) That only a very small portion of the old ruined wall and rubble have to be cleared away.

"(2*nd*) That during the construction there will never be more openings than the proposed entrance through which the sea can come.

"(3*rd*) That it allows the work to be proceeded with at present at least for 4 months or more."

I may add that I prefer my original suggestion as it stands in plan No. IV to its modified form as plan No. III, because, in addition to the above-mentioned advantages, No. IV allows more sea room and involves less disturbance at the mouth of the harbour from the action of confluent waves. The relative estimates of plans Nos. III and IV are Rs. 61,00,000 and Rs. 62,45,000, respectively.

The ends of the covering arm should, in my opinion, be turned inwards instead of outwards as shown on the drawings.

If No. III is to be carried out, I would strongly recommend a slight modification of it, as shown by the blue lines which I have drawn on the plan No. III that accompanies the report of the committee.

Order—dated 6th March 1888, No. 764 W., Public Works.

Communicated to the Harbour Trust Board for consideration, in continuation of G.O. No. 404 W., dated 4th February 1888.

(True Extract.)
(Signed) J. O. HASTED, Colonel, R.E.,
Secretary to Govt., P.W.D.

G.O., dated 9th June 1888, No. 1715 W., Public Works.

Read—the following paper:—

From the Secretary to the Government of India, Public Works Department, dated 23rd May 1888, No. 261 M.

In continuation of Public Works Department No. 106 M., dated the 28th February 1888, I am directed to forward, for the information of His Excellency the Governor in Council, the accompanying copy of a further Note, dated the 5th May 1888, by Mr. Molesworth, the Consulting Engineer to the Government of India for State Railways, on the subject of the best position for the entrance to the Madras harbour.

Enclosure.

Note by G. L. Molesworth, Esq., *Consulting Engineer to the Government of India for State Railways, dated 5th May* 1888, *on the subject of the best position for the entrance to the Madras Harbour.*

When I wrote my last Note on the Madras harbour, I had not seen the minutes of evidence which induced the committee to prefer plan No. III on "nautical grounds." I have now had an opportunity of studying that evidence, and I would suggest, for consideration, a slight modification of the plan I originally suggested (marked No. IV). This modification consists simply in prolonging slightly further the eastern arm which I had suggested; and also slightly altering the tangent point from the north-eastern elbow so as to change its position instead of having it in the position in which it was originally built.

I have shown the prolongation of the eastern arm sufficiently long to cover the opening and protect it from seas coming in, even at an angle of 30° from the normal direction.

In my report on the Madras harbour, dated March 1st, 1882, para. 96, I advanced the opinion that "the *waves of a dangerous character must always come in broadside to the shore or nearly so* whatever the position of the storm;" and in paras. 75 and 76 of that report, I gave my reasons for the opinion I advanced. This opinion is confirmed by the experience of nautical men, as given in the evidence. The direction of the waves is stated to be quite

independent of the direction of the wind, and that the heavy swells come in nearly broadside to the shore, even when the wind is blowing off the shore. Others state that the direction of the waves never exceeds an angle of 30° from the normal, but I doubt very much whether any waves, except those of oscillation, which are comparatively harmless, can possibly come in at any angle approaching this.

In fact, it is opposed to the laws governing the motion of waves that a *wave of translation* should deviate to any considerable extent from the parallel of the general direction of the contour lines of the bottom of the sea to seaward of the harbour.

An arm covering an angle of 30° will, however, be on the safe side, as protecting the entrance to the harbour, even from waves of oscillation.

I annex a sketch showing the modifications I would propose in my original suggestion; the existing work being shown in black lines, my suggestion of July 1883 in red lines, and the slight modifications I now propose in blue lines.

These modifications will, in my opinion, meet any objections that may be raised on "nautical grounds" to my original suggestions, whilst they will be free from some of the objections to which project No. III is exposed.

Order—dated 9th June 1888, No. 1715 W., Public Works.

Communicated to the Chairman, Harbour Trust Board, for early remarks, in continuation of G.O. No. 764 W., dated 6th March 1888.

(True Extract.)

(Signed) J. O. HASTED, Colonel, R.E.,
Secretary to Govt., P.W.D.

From R. W. BARLOW, Esq., C.S., Chairman, Harbour Trust Board, to the Chief Secretary to Government, Marine Department, dated Madras, 21st June 1888, No. 1086.

I have the honor to acknowledge G.O. No. 1715 W., dated the 9th instant, forwarding, for the remarks of the Board, a note with plan attached by Sir G. Molesworth regarding the best position for a north-east entrance to this harbour. These were, after circulation, very carefully considered at the meeting of the trustees on the 19th instant, and I submit copy of the resolution then passed, together with copy of a letter from the Board's engineer, No. 368, dated 18th idem, replying to a reference made to him on the subject.

2. Sir G. Molesworth's plan, if carried out, would give the harbour a slightly larger area, but this would be of no practical use for the anchorage of vessels; it would also afford additional protection against waves of translation coming in at a maximum angle of 30° from north of the normal direction; but the trustees note that Sir Guilford gives it also as his opinion that "waves of a dangerous character must always come in broadside to the shore, or nearly so," and in this the trust fully concur, while they also agree with him that "waves of oscillation" are "comparatively harmless," even should they come in at an angle approaching 30°.

3. The Board consider that they would not be justified in incurring the additional heavy expenditure and delay which the adoption of Sir G. Molesworth's design would involve. The junction of the new curves at the north and south arms with the old works, left undamaged by the cyclone of November 1881, proved a most difficult and costly undertaking, and the trust are not disposed to accept any modification that would involve a repetition of this at the north arm. The revised plan would further necessitate the removal of a considerable portion of the *new* work at the northern arm at a heavy outlay, protected, as it is, by a 40-feet wave-breaker screen. The proposed alteration would, besides, carry the south arm into deeper water, as pointed out by our engineer involving still further expenditure. Under a review of the above conditions, the Board are decidedly opposed to the modification suggested by Sir G. Molesworth, and adhere to plan III or IV, as already submitted to Government.

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Enclosures.

From F. N. THOROWGOOD, Esq., M. Inst., C.E., Superintendent, Madras Harbour Works, to the Chairman, Harbour Trust Board, dated Madras, 18th June 1888, No. 368.

I have the honor to return, herewith, the papers which accompanied your letter No. 954, of June 13th, with Sir Guilford Molesworth's modified plan for an entrance to the Madras harbour.

It appears to me that nearly the whole of the outer portion of the north pier will have to be taken up to carry out the design proposed, and the greater depth of water into which the south arm is brought will undoubtedly add to the cost of the work and increase the time of construction.

Extract of Proceedings of the Trustees of the Harbour of Madras, at a meeting held at the offices of the Board, on Tuesday the 19th day of June 1888.

* * * *

9. Read letter from the Engineer, Harbour Trust Board, No. 368, dated 18th June 1888, submitting report upon the modified plan for an entrance to the Madras harbour, by Sir Guilford Molesworth, communicated with G.O. No. 1715 W., dated 9th June 1888.

Resolved that the additional protection afforded would not justify the increased expenditure and delay which would be incurred by the necessity for taking up a large portion of the new work recently constructed at the head of the north arm.

* * * *

(True Extract.)

(Signed) C. PINSENT,
Secretary, Harbour Trust Board.

Transferred to the Public Works Department.

Ootacamund,
23rd June 1888.

(Signed) H. E. STOKES,
Chief Secretary.

Note by the Chief Engineer, Public Works Department.

To a member of the committee appointed in 1883, which first suggested a north-east entrance to the harbour, a perusal of the report of the committee appointed by the Secretary of State to consider the subject, with the interesting notes of evidence, must be satisfactory. It seems now at last to be allowed generally that a north-east entrance is necessary, and it is the opinion of eminent nautical men that steamers can enter and leave the harbour by such an entrance without much difficulty.

2. This opinion was all that was needed by this Government.

3. There seems to be no reason why the Government should not accept, without hesitation, the position of entrance as approved by the Home committee, and generally by the Harbour Trust Board; the only apparent objection to it is that it necessitates the removal of a very considerable extent of old work which would have been avoided by the adoption of either plan No. 1 (originally proposed) or plan No. 2. It has, however, the advantage of opening in deeper water rather further from the shore and this may be worth the extra cost.

4. There is, however, another plan very recently submitted by Sir G. Molesworth, which was not before the Home committee, and which, coming from such an authority, deserves consideration. This plan is a considerable modification of one formerly submitted by Sir G. Molesworth, as it provides, by an altered form of the arms, for completely sheltering the entrance from waves approaching the coast from any possible direction north of the normal, which his former plan did not. It would, moreover, increase the accommodation within the harbour, and would bring the entrance further from shore than the plan approved by the Home committee. In all respects, therefore, the proposal is a good one; but we have no estimate of its cost, and it is evident from the length of the arms and the depth of water in which they are to be constructed that it must much exceed that of the proposal by the Home committee,

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while it would seem that at least as much old work has to be removed in one case as in the other. The Harbour Trust Board are opposed to the scheme (*see* their letter, No. 1086, dated 21st June 1888).

It is right that Sir G. Molesworth's note and proposal should be laid before the Secretary of State, but it seems to be questionable whether the advantages which it secures are sufficient to warrant additional outlay and consequent delay in completion of the harbour.

5. In his remarks on the report of the Home committee, Mr. Parkes enters very fully into the subject of the advance of sand on the works which the evidence before the committee led them to suppose was a very serious matter, and which they adduced as one reason for their preference for a north-east entrance. The Harbour Trust Board briefly dispose of this subject, considering that it is a matter of no present practical importance, and that had the committee been in possession of information which Mr. Parkes states he received after the sittings of the committee, they would probably never have alluded to the subject. The committee apparently had before them surveys of the harbour up to 1887, and from the soundings in 1886 came to the conclusion that the sand was advancing south of the works faster than was anticipated. Mr. Parkes maintained that the apparent advance in 1886 was due to the heavy cyclone sea in May 1886, and would not be found to be a real advance; the information which he received after the committee ceased their sittings was from a survey made in September 1887, and which showed that the actual advance during the year near the works was considerably less than that anticipated by the committee. This certainly strengthens Mr. Parkes's position, and the result of examination, made at different times, of the soundings leads to the conclusion that the advance of sand need not be considered as such a serious matter as the committee think. The committee considers the sand will have advanced to the end of the south arm in twenty years, Mr. Parkes says 50 or 60 years, but he [illegible] calls attention to another point; he says, contend that it is now well established how the sand comes, and in what quantities it comes, and therefore how it may be intercepted when it becomes necessary, and what the cost of intercepting it will be. It may be added that that cost, which will not be required for 50 years, will not therefore be a serious burden on the trade." It is submitted that Mr. Parkes's views on the question are sound, and that the advance of sand is not a matter for present consideration.

6. Mr. Parkes's views as to the question of a north-east entrance are not definitely stated in his remarks on the committee's report. He refers to the conflict of opinion between the two committees appointed by the Secretary of State, and apparently considers the question to be still unsettled. He doubts whether the present strong feeling in favor of the north-east entrance will be permanent at Madras, and suggests that Captain Taylor's successor may hold different views, that the Harbour Trust Board is a changing body, and that the financial view of the question may alter the present opinion. To this it may be replied that from June 1883, when the committee appointed in Madras proposed the north-east entrance, all authorities in Madras have persistently advocated the north-east entrance; the Harbour Trust Board, from the date of their constitution, were strongly in favor of it, and as at present constituted, with the successor of the late Captain Taylor as member, have expressed themselves more strongly than ever in favor of it, and the financial position has been carefully estimated by the Board and reviewed by Government in G.O. No. 151, Marine, dated 25th April 1888. The Government have always been in favor of the north-east entrance, while allowing that the question was one on which nautical opinion deserved the highest consideration, and, now that a committee of eminent naval and engineering authorities, selected by the Secretary of State, have reported in favor of it, it is considered that the question should be finally disposed of and the north-east entrance adopted.

7. Considering, therefore, the question settled and the form of entrance suggested by the Home committee adopted, it remains to be decided how the work is to be carried out, and on this point the Board has little to say. Mr. Parkes is evidently in favor of proceeding on the sanctioned plan till each pier is built to within about

300 feet of its termination; in fact, almost completing the harbour on the present sanctioned design, and then removing part of the work to form a north-east entrance. He suggests that the question of a change of entrance might then be reconsidered, but following what has been said above, the suggestion should be rejected. He says, "To carry out the work to that extent would take about eighteen months, during every month of which time the shelter would be improving. To proceed on the plan recommended by the committee, the first two or three years would be spent in opening the harbour still more to the sea, and that in the most dangerous possible form, while a further three years would be occupied before anything like efficient shelter would be obtained." This may be true, but it has to be remarked that the work to be removed to form a north-east entrance at present is much shattered and comparatively easy of removal, while if the harbour is nearly completed on the present design, the work to be removed will be the strongest part, most carefully fitted together, and the difficulty of removing it may then be considered too serious to be overcome. In either case special machinery will probably have to be procured for the removal of the old work, and we ought to have careful estimates of what the cost would be in both cases. It may possibly prove, as the best way of completing the harbour expeditiously, that the northern arm should be nearly completed on the line of the present design, so that one crane could be used in constructing the protecting arm of the committee's approved plan, while another is pushing on the southern arm, but it can hardly be the most economical plan, and it should be considered, if this method of working is be adopted, whether the section of the work, which would only have to stand for a year or two, should not be modified with a view to the easy removal of the blocks as soon as the protecting arm is completed. The most economical method of working would, it is believed, be to clear the north-east entrance as expeditiously as possible, and then close the existing entrance and run on the protecting arm, for which a very large amount of material would be in readiness. The harbour would be more exposed than it is at present for the time, but probably even then it would only be for a few days in the north-east monsoon that the sea inside would be too rough for work; during the south-west monsoon it would be quite sheltered.

8. If the question of a north-east entrance is now definitely settled, this question of how the revised plan is to be carried out will be of the first importance. The Board might, it is suggested, be asked to prepare detailed estimates of the cost of removing the old work, and to state their views on the subject of opening the north-east entrance at once, in order that there should be no delay in proceeding with the work on receipt of approval of the Secretary of State to a change in design.

Bangalore,
27th June 1888.

(Signed) J. O. HASTED, Colonel, R.E.,
Chief Engineer, P.W.D.

Order—dated 1st August 1888, No. 2335 W., Public Works.

In accordance with the earnest request of the Government, in their letter No. 1437 W., dated 9th June 1884, to the Secretary to the Government of India that the question of a north-east entrance to the harbour should be referred to more competent nautical authority, the Right Honorable the Secretary of State appointed a committee composed of Admirals Salmon and Nares and Sir J. Coode, to report on the subject.

2. The Governor in Council has read with much interest the committee's report and the voluminous notes of evidence taken by them, and is gratified to learn that the committee shares the views held by this Government as well as by all competent authorities in the Presidency, and is in favor of an entrance at the north-east corner of the harbour, with a covering arm. An entrance at this corner would possess the additional advantage of being fully protected against naval attack by the shore batteries, which it is proposed to construct to the north of the harbour; but an entrance in the centre of the eastern arm can receive but little protection from shore

batteries, and that arm would, within a certain distance, afford cover to boats attempting to force an entrance for the purpose of destroying the shipping in the harbour.

3. The plan proposed by the committee has been generally approved by the Harbour Trust Board and by the Chief Engineer, and is accepted by the Government.

4. The Harbour Trust Board will be requested to submit their views as to the best method of carrying out this plan with an estimate of the cost, and of any further machinery that may be required, and the Secretary of State will be asked to communicate by wire his sanction to the prosecution of the work on the committee's design.

Ordered that the Secretary of State be addressed.

(Here enter No. $\frac{11}{2335\ W.}$, dated 1st August 1888.)

(True Extract.)

(Signed) J. O. HASTED, Colonel, R.E.,
Secretary to Govt., P.W.D.

To the Chairman, Madras Harbour Trust Board.
" Marine Department.

Endorsement—dated 1st August 1888, No. 2336 W., Public Works.

Copy of the above, with copy of the despatch to the Secretary of State, forwarded for the information of the Government of India.

(Signed) J. O. HASTED, Colonel, R.E.,
Secretary to Govt., P.W.D.

Exd. F. R. Bantleman.
Spare Copies

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BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1888} Madras.

PUBLIC WORKS.

Dated August, 1st.

Recd. *Encl.*

G.O., 1st Aug. 1888, Nos. 2335, 2336 W.

AUGUST.

Madras Harbour

Forwarding copy of Proceedings on the report of the Home committee regarding the best position for an entrance to the Madras Harbour; and requesting early intimation of the final adoption of the committee's plan.

PUBLIC WORKS DEPARTMENT.

Letter—to

The Right Honorable the SECRETARY of STATE for INDIA.

My Lord,

We have the honor to acknowledge receipt of Your Lordship's despatches, No. 6, Public Works, dated 6th May 1887; No. 10, Public Works, dated 24th November 1887; and No. 11, Public Works, dated 15th December 1887, respectively, with report of the committee appointed by Your Lordship to consider the best position for the entrance to the Madras Harbour and notes of evidence; and remarks by Mr. Parkes thereon.

2. We have communicated these papers to the Harbour Trust Board, and have now the honor to forward, for Your Lordship's perusal, copy of our Proceedings No. 2335 W., dated 1st August 1888, embodying a report by the Board and a Note by the Chief Engineer, Public Works Department.

3. We have carefully considered all that has been written on the subject, and are prepared to accept the plan proposed by the committee, which we consider will best meet all requirements. We would, however, call Your Lordship's attention to a plan* recently proposed by Sir G. Molesworth, which would also, we think, meet all requirements, and possesses some advantages which the committee's plan does not, but which would, we consider, prove more costly.

* *See* letter from Chairman, Harbour Trust Board, No. 1086, dated 21st June 1888.

4. We shall await intimation from Your Lordship that the plan proposed by the committee has been finally adopted, but we have the honor to request that this may be made by telegraph. Meanwhile, we have called on the Harbour Trust Board for an expression of their views as to the best means of carrying out the proposed plan and for a detailed estimate of the cost. We are fully impressed with the necessity for adopting an expeditious method of carrying out the works to completion, but we are not convinced that Mr. Parkes's proposal to nearly complete the work on the existing sanctioned plan before clearing the north-east entrance will prove economical or satisfactory.

5. We have the honor to solicit Your Lordship's favorable consideration of the Board's request that the rate of interest upon capital advances may be reduced from $4\frac{1}{2}$ to 4 per cent. per annum, which appears to us reasonable. With reference to the

concluding paragraphs of the Chairman's letter No. 69, dated 6th April 1888, we have communicated to the Harbour Trust Board Your Lordship's despatch dated 7th June 1888, No. 4.

We have the honor to be,

My Lord,

Your Lordship's most obedient, humble servants,

(Signed) CONNEMARA.
(„) C. G. ARBUTHNOT.
(„) P. P. HUTCHINS.
(„) H. E. STOKES.

Ootacamund,
1st August 1888.

Ed. F. R. Bastleman.

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GOVT. OF MADRAS.

PUBLIC WORKS DEPARTMENT.

LETTER to the Right Honorable the Secretary of State for India.

No. $\frac{11}{2335\ W.}$, dated 1st Aug. 1888.

Forwarding copy of Proceedings on the report of the Home committee regarding the best position for an entrance to the Madras Harbour; and requesting early intimation of the final adoption of the committee's plan.

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GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buidings and Roads.
Civil Works.

READ—the following paper:—

From R. W. BARLOW, Esq., C.S., Chairman, Harbour Trust Board, to the Chief Secretary to Government, Marine Department, dated Madras, 12th September 1888, No. 2468.

I have the honor to submit herewith, for the information of Government, copy of resolution passed by the trustees at their meeting on the 4th instant, and a sketch of the southern arm showing the modifications necessitated in its protection consequent upon the advance of the sand. The trustees now propose to commence the deposit of wave-breaker blocks at the same depths of water as provided in the sanctioned design.

2. With reference to the concluding portion of the resolution "(*e*)," I am requested to ask that (1) as Mr. Parkes has not yet supplied any designs for pier heads, the Secretary of State may be requested to direct him to furnish them at an early date; (2) that as no steps have been taken to protect the rubble base with concrete in bags according to the sanctioned design, Mr. Parkes may be requested to state the nature of the instructions, if any, that he issued to Mr. Thorowgood regarding this portion of the design; (3) that Mr. Parkes' attention may be drawn to the faulty construction of the wave-breaker crane, which the Board understand was designed by him, but which is incapable of passing round the curves of the arms, either at the north or south piers, the wheels on either side being rigid and in line, and it cannot therefore deposit wave-breaker blocks on the eastern face of the harbour walls till altered.

3. I am further requested to ask that the Board may be supplied with copies of all correspondence which has passed between Mr. Parkes and the late Engineer, referring solely to the construction of the harbour, and which is not of a private nature. At present there are no records of any description as to the instructions, if any, issued by the Engineer-in-Chief to the Superintendent; none at any rate are forthcoming. The Board consider that all instructions to the Superintendent should be regarded as the property of Government, and would submit that they should now be accessible to the trustees for reference.

———

Transferred to the Public Works Department.

(By order.)

17th September 1888.

(Signed) W. S. MEYER,
Ag. Assistant Secretary.

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Enclosure.

Extract of Proceedings of the Trustees of the Harbour of Madras at a meeting held at the offices of the Board on Tuesday the 4th day of September 1888.

* * * *

2. Read letter from the Superintendent, Madras Harbour Works, No. 735, dated 29th August 1888, reporting that it would be advisable to protect the south arm of the harbour with wave-breaker blocks, as provided in the sanctioned design. Read also letter No. 742 of the same date reporting that certain alterations are needed in the wave-breaker crane.

Read minutes by the Chairman, Captain W. L. C. Baddeley, R.E., Captain H. A. Street, I. M., Messrs. J. R. Hunter and Cowasjee Eduljee Panday.

Resolved (*a*) that the Engineer be authorized to proceed with the protection, by wave-breaker blocks, of the south arm of the harbour, according to the sanctioned design, subject to the modification necessitated by the advance of sand outside the arm; (*b*) that the Engineer be authorised to proceed with such alterations to the wave-breaker crane as he considers necessary to enable it to travel round the curves of the north and south arms, which it was originally intended to traverse; (*c*) that the Madras Government be requested to communicate with the Secretary of State in reference to (1) a design for pier heads; (2) protection of the rubble base by concrete in bags; (3) the faulty construction of the wave-breaker crane.

* * * *

(True Extract.)

(Signed) C. PINSENT,
Secretary, Harbour Trust Board.

Order—dated 1st October 1888, No. 3068 W., Public Works.

Ordered that the Secretary of State be addressed accordingly.

(True Extract.)

(Signed) J. O. HASTED, Colonel, R.E.,
Secretary to Govt, P.W.D.

To the Chairman, Harbour Trust Board.
" Marine Department.

Exd. J. Henricus.
Spare Copies

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BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1888} Madras.

PUBLIC WORKS.

Dated October, 1st.

Recd. *Encl.*

G.O., 1st Oct 1888, No. 3068 W.

OCTOBER.

Madras Harbour Works

Ordered that the Secretary of State for India be addressed in view to the information required by the Harbour Trust Board in connection with the — being furnished by Mr. Parkes.

PUBLIC WORKS SECRETARIAT

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PUBLIC WORKS DEPARTMENT.

Letter—to

The Right Honorable the SECRETARY of STATE for INDIA.

My Lord,

In forwarding the accompanying copy of a resolution by the Madras Harbour Trust Board and of the Chairman's letter by which it is accompanied, we have the honor to request that the papers may be communicated to Mr. Parkes with a view to the information desired by the Board being furnished by that officer.

We have the honor to be,
My Lord,
Your Lordship's most obedient, humble servants,

(Signed) CONNEMARA.
(,,) P. P. HUTCHINS.
(,,) H. E. STOKES.

Ootacamund,
1st October 1888

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Exd. J. Henricus.

GOVT. OF MADRAS.

PUBLIC WORKS DEPARTMENT.

LETTER to the Right Honorable the Secretary of State for India.

No. $\frac{19}{3068\ W.}$ dated 1st Oct. 1888.

Forwarding copy of a resolution by the Madras Harbour Trust Board together with the Chairman's letter, and requesting that the information required by the Board in connection with the harbour may be furnished by Mr. Parkes.

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GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

READ—the following paper :—

From R. W. BARLOW, Esq., C.S., Chairman, Harbour Trust Board, to the Chief Secretary to Government, Marine Department, dated Madras, 19th October 1888, No. 2685.

I have the honor to acknowledge the receipt of G.O., No. 2335 W., Public Works, dated 1st August 1888, and to submit herewith, for the information of Government, copy of letter No. 909, dated 1st October 1888, from the Board's Engineer furnishing all details that the late Superintendent has left on record with regard to No. III design, and further forwarding his report, plans and estimates for carrying out a modification of plan IV ; also copy of a resolution passed thereon by the Trustees at their meeting of 5th idem, in accordance with which a telegram was despatched to you that evening, copy of which is enclosed.

2. In my letter No. 69, dated 6th April 1888, para. 7, I informed Government that the Trustees preferred "plan No. III, but * * * any modification of plan III or IV, or any plan, which will give them * * * this (smooth water) within a reasonable time, at a cost which the port can afford to pay, is all they have contended for as being absolutely necessary." The enormous mass to be removed to carry out plan No. III has never until now been clearly explained to the Trustees, nor has the great protection the old, partly submerged, wall will afford to the new work ever before been clearly demonstrated, as has now been done, in the cross sections shown on the plan forwarded herewith, and the Board are now of opinion, in view of this very clear information afforded by their Engineer, that the danger of repeated wreckage of dredging plant, and the uncertainty as to the time of completion, are fatal objections to Mr. Thorowgood's proposals, although approved by the Home Committee, who, however, were not in possession of the information now placed before the Board, and only approved of plan No. III on *nautical* grounds.

3. The Trustees observe that in his note, dated 27th June 1888, the Honorable Colonel Hasted remarks that "It may possibly prove, as the best way of completing the harbour expeditiously, that the northern arm should be nearly completed on the lines of the present design, so that one crane could be used in constructing the protecting arm of the Committee's approved plan while another is pushing on the southern arm, but it can hardly be the most economical plan, and it should be considered, if this method of working is to be adopted, whether the section of the work, which would only have to stand for a year or two, should not be modified with a view to the easy removal of the blocks as soon as the protecting arm is completed." The Trust now note that Mr. Pogson's proposals for carrying this suggestion into effect would appear to be not only the most expeditious, but also the most economical. I should mention here that a sketch of the modification of the design of the proposed completed entrance, No. IV A, has been shown to Sir Guilford Molesworth by one of the Trustees, Mr. Hanna, M.I.C.E., now at Simla, and has met with his "entire approval," and Sir Guilford has authorized me by wire to use this expression of his opinion.

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4. The Trustees unanimously approve of Mr. Pogson's proposals for a north-east entrance and prefer his plan to all others that have come before them. As regards his remarks at para. 27, the Trust can have no possible objection to this plan affording as it progresses further practical information as to what would be the effect of an eastern entrance when completed. If, then, it is found that an eastern entrance will not give sufficiently smooth water, the Board are unanimously of opinion that plan No. IV A should be adopted, if the financial position of the port will admit of it. Smooth water is essential, and if they obtain this, as they have clearly expressed themselves in their No. 69, dated 6th April 1888, the precise plan by which that result can be obtained is a matter of comparative indifference; but the one now submitted seems more likely than any other, to effect this economically, by using the debris of the old submerged works, as well as utilizing the shelter afforded by it, and the Board have therefore adopted it; and if Government approve of the Board's resolution, I am desired to request that the matter may be referred to the Secretary of State for sanction and that his decision may be communicated by wire, so that the Trustees may be in a position to direct Mr. Pogson to resume work upon the sanctioned design at the north arm immediately the conclusion of the coming north-east monsoon renders active operations practicable.

Transferred to the Public Works Department.

(By order.)

24th October 1888.

(Signed) W. S. MEYER,
Ag. Assistant Secretary.

Order—dated 17th November 1888, No. 3644 W., Public Works.

The Right Honorable the Governor in Council resolves to submit the papers forwarded by the Harbour Trust Board to the Secretary of State for decision. The plan proposed is in accordance with Mr. Parkes' suggestions and merits much consideration.

2. Ordered that the Secretary of State be addressed.

(True Extract.)

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

To the Chairman, Harbour Trust Board.
" Marine Department.

Letter—to the Secretary to the Government of India, Public Works Department, dated Fort St. George,, 17th November 1888, No. 3645 W.

I am directed to forward herewith, for the information of the Government of India, a copy of the Proceedings of this Government, No. 3644 W., dated 17th November 1888, together with copy of the despatch to the Right Honorable the Secretary of State submitting proposals for the completion of the Madras Harbour Works.

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

Exd. J. Henricus.
Spare Copies

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BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of Madras. 1888

PUBLIC WORKS.

Dated November, 17th.

Read. *Encl.*

G.O., 17th Nov. 1888, Nos. 3644, 3645 W.

NOVEMBER.

Madras Harbour

Forwarding copy of Proceedings, together with copy of despatch, to the Right Honorable the Secretary of State submitting proposals for the completion of the —.

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PUBLIC WORKS DEPARTMENT.

LETTER—to

THE RIGHT HONORABLE THE SECRETARY OF STATE FOR INDIA,

LONDON.

MY LORD,

In continuation of our despatch, dated the 1st August 1888, regarding the Madras Harbour, we have the honor to forward a letter from the Harbour Trust Board submitting their detailed proposals, with plans and estimates, for completing the Madras Harbour.

2. It will be observed that the Harbour Trust Board prefer on engineering grounds a form of entrance based on plan marked IV in the Report of the Committee of 1887, or plan A in Mr. Parkes' letter * of the 25th November 1887, and propose to carry out the work according to Mr. Parkes' suggestion made in paras. 30 to 34 of his letter; that is to say, they propose as a first step virtually to restore the harbour to the state it was in previous to the storm of November 1881 with an eastern entrance. Should it then be found that the eastern entrance does not give sufficiently smooth water, the north-east entrance can be gradually substituted without serious engineering difficulties, and during the period of alteration from the eastern to the north-east entrance the usefulness of the harbour will be in no way impaired.

* *Vide* despatch from the Secretary of State, No. 11, Public Works, dated 15th December 1887.

3. The proposals of the Harbour Trust Board are clear and appear to us to contain all the information necessary to enable your Lordship to arrive at a decision as to the manner in which work on the harbour should now be resumed; and we would point out that, although the Committee of 1887 preferred plan No. III on *nautical grounds*, we believe that no exception on such grounds can be taken to the new plan No IV A, while the arguments in favor of its adoption, on engineering grounds, are very strong.

4. In conclusion, we would ask that your Lordship's decision as to the preliminary step of restoring the harbour with an eastern entrance may be communicated to

us by wire, as it is of the greatest importance that none of the next working season be lost.

We have the honor to be,
My Lord,
Your Lordship's most obedient, humble servants,

(Signed) CONNEMARA.
(„) C. G. MASTER.
(„) H. E. STOKES.

MADRAS,
17th November 1888.

Exd. J. Henricus.

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GOVT. OF MADRAS.

PUBLIC WORKS DEPARTMENT.

LETTER to the Right Honorable the Secretary of State for India.

No. $\frac{24}{3644\ W.}$, dated 17th Nov. 1888.

Forwarding, with remarks, letter from the Harbour Trust Board submitting detailed proposals with plans and estimates for completing the —.

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GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

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Buildings and Roads.
Civil Works.

READ—the following paper:—

Despatch from the Right Honorable VISCOUNT CROSS, Her Majesty's Secretary of State for India, to His Excellency the Right Honorable the Governor in Council, Fort St. George, dated India Office, London, 15th November 1888, No. 10 (Public Works).

I have received your Excellency's Public Works letter No. 19, dated 1st October 1888, enclosing copy of a letter which has been addressed to your Government by the Harbour Trust Board, in which it is requested that a reference may be made to Mr. Parkes on certain points in connection with the reconstruction of the harbour.

2. I now enclose copy of a memorandum prepared by Mr. Parkes, giving his replies to the various questions raised. With regard to the Board's request that they may be furnished with copies of all correspondence, not of a private nature, which has passed between Mr. Parkes and the late Engineer, I would refer you to Mr. Parkes' remarks on the subject, and would add that, while he occupies the position of Consulting Engineer for the works, it would be convenient if any technical point of detail, on which the Engineer of the Trust may desire to have his opinion, were dealt with by unofficial communication between himself and the Engineer in charge, as suggested in my Public Works despatch No. 4, dated 7th June 1888.

—

ENCLOSURE.

Madras Harbour.

The first demand is for designs for pier heads. I shall be prepared to furnish detailed plans of these when the question of the position of the entrance is decided. Till then it would be useless to do so. The plans accompanying my report of 21st August 1888 give all particulars that can be required at present.

2. Second, as to the protection of the rubble base with concrete bags. The intention of Sir John Hawkshaw's Committee with regard to this is not very clear, and it is likely the whole subject may have to be reconsidered. Previous to doing this, however, I am desirous of obtaining the result of the last seven years' experience of the effect of the sea upon the inner slope of the rubble base. I requested Mr. Thorowgood some time ago to furnish me with this, but have not yet received it from him or Mr. Pogson. The matter is not urgent, but I shall be ready to act on that information when I receive it.

3. Third, as to the alleged "faulty construction of the wave-breaker crane." The crane was ordered to be made with sufficient play between the flanges of the wheels on the rail to enable it to go round a curve of 400 feet radius (the sharpest curve which it has to traverse at Madras having a radius of 470 and 454 feet on the outer and inner rails, respectively). On referring to the drawings of the crane as completed, I find this condition was strictly adhered to, so that if there is any difficulty it is not through faulty construction of the crane, but through inaccurate laying of the rails.

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4. With respect to the copies of the correspondence for which the Board asks, there is none in existence of the kind required. Since 1881 I have never given any instructions (and scarcely any before that), though I have frequently given explanations and made suggestions which it was within the discretion of the Superintendent to adopt or not. To interpret such suggestions as instructions would be inconsistent with the spirit of our correspondence, and could only lead to difficulty. At the same time, I am quite ready to furnish replies to any definite questions from Mr. Pogson, either officially to the Government or unofficially to him.

5. I feel it my duty to call attention to the fact that the present reference affords at least four instances of the extreme inconvenience of the cessation of direct correspondence between the Engineer in charge of these works and myself. Not one of the above questions need have been made the subject of official reference. Even if a private reference to me had been desirable in any case, I could have put the matter in a form to bring it within the discretion of the Engineer in charge. I have already, under authority of the India office letter of 20th September, applied to Mr. Pogson for a renewal of that correspondence, and I feel confident that, if this is acted on, such references as those under reply will be unnecessary for the future.

24th October 1888.

(Signed) W. PARKES.

ORDER—dated 13th December 1888, No. 3919 W., Public Works.

Communicated to the Chairman, Madras Harbour Trust Board, with reference to G.O., No. 3068 W., dated 1st October 1888.

(True Extract.)

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

To the Chairman, Madras Harbour Trust Board.
" Marine Department.

Exd. J. Henricus.
Spare Copies

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BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1888} Madras.

PUBLIC WORKS.

Dated December, 13th.

Recd. *Encl.*

G.O., 13th Dec. 1888, No. 3919 W.

DECEMBER.

Madras Harbour Works

Despatch from the Secretary of State forwarding copy of a memorandum by Mr. Parkes affording the information required by the Harbour Trust Board regarding the —, and remarking on the Board's application for copies of correspondence, not of a private nature, which passed between Mr. Parkes and the late Engineer, communicated to the Chairman, Harbour Trust Board.

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GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

READ—the following telegram from C. S. COLVIN, Esq., Assistant Secretary, Public Works Department, to the Right Honorable the Governor of Madras, dated India Office, London, 24th December 1888 :—

Resume Harbour Works as proposed and prepare abutment blocks. With regard to general scheme, despatch follows.

ORDER—dated 22nd January 1889, No. 174 W., Public Works.

Communicated to the Chairman, Madras Harbour Trust Board, with reference to G.O., No. 3644 W., dated 17th November 1888.

(True Extract.)

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

To the Chairman, Madras Harbour Trust Board.
" Marine Department.

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Exd. J. Moses.
Spare Copies

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1889} Madras.

PUBLIC WORKS.

Dated January 22nd.

Recd. *Encl.*

22nd Jan. 1889, No. 174 W.

JANUARY.

Madras Harbour Works

Telegram from the Secretary of State for India directing to resume the — as proposed and to prepare abutment blocks, and stating that a despatch with regard to general scheme will follow, communicated to the Chairman, Madras Harbour Trust Board.

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GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

READ—the following papers :—

From J. P. FIDDIAN, Esq., C.S., Acting Chairman, Harbour Trust Board, to the Chief Secretary to Government, dated Madras, 19th January 1889, No. 246.

I have the honor to submit, for the information of Government, copy of a resolution passed by the Harbour Trust Board at their last meeting (in reference to G.O., No 3919 W., dated 13th December), in which Mr. Pogson has been directed to forward, for the information of the Board, copies of all correspondence with Mr. Parkes relating to the Harbour Works.

2. The Board note that since 1881 Mr. Parkes has "never given any instructions (and scarcely any before that) to the Harbour Works Engineer, but has frequently made suggestions which it was within the discretion of the Superintendent to adopt or not."

3. At para. 6 of the despatch from the Right Honorable the Secretary of State, No. 4, dated 7th June 1888, His Lordship says that he wishes "it to be clearly understood that in no case will orders be given by or from Mr. Parkes, but that his suggestions should receive due attention."

4. While the Board do not object to "unofficial communications" between Mr. Parkes and their Engineer; until in June next the Right Honorable the Secretary of State again takes into consideration the desirability of retaining Mr. Parkes' services, the Trustees consider that any "suggestions" he may have to make should, as ruled by the Right Honorable the Secretary of State in the above despatch, be transmitted officially through the India Office to Government, and that the Board should receive the earliest possible intimation of any suggestions, instructions or orders, from whatever source emanating, in any way relating to the Harbour which they hold in trust.

ENCLOSURE.

Extract of Proceedings of the Trustees of the Harbour of Madras, at a meeting held at the offices of the Board, on Friday, the 11th day of January 1889.

* * * * *

Read—G.O., No. 3919 W., dated 13th December 1888, forwarding copy of memorandum by Mr. Parkes, replying to the Board's inquiry regarding pier-heads, rubble base and wave-breaker crane; also G.O., No. 3068 W., dated 1st October 1888, with previous correspondence.

Read—minutes by Messrs. G. G. Arbuthnot and J. R. Hunter and Captain H. A. Street, Her Majesty's Indian Marine.

Resolved—that the Engineer be directed to submit to the Board copies of all communications between himself and Mr. Parkes so far as they relate to the Harbour works.

Resolved, further,—that the Chairman be requested to address Government on the subject, pointing out the advisability of the Board being kept informed of all matters connected with the Harbour.

* * * * *

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Transferred to the Public Works Department.

(By Order.)

(Signed) W. S. MEYER,
Assistant Secretary.

23rd January 1889.

G.O., No. 174 W., dated 22nd January 1889.

Despatch from the Right Honorable the Secretary of State for India, to His Excellency the Right Honorable the Governor in Council, Fort St. George, dated India Office, London, 24th January 1889, No. 2 P.W.

I have received your Excellency's Public Works letter, No. 24, dated 17th November 1888, forwarding a letter from the Madras Harbour Trust Board, submitting detailed proposals for completing the Madras Harbour.

Reconstruction of Madras Harbour.

2. The design for the entrance which now finds favor with the Trust Board is a modification of the plan IV, considered by the London Committee of 1887, and, in common with the plan A proposed by Mr. Parkes, possesses the advantage of allowing the works of reconstruction to be continued, for the present at least, on the lines of the sanctioned design, and thus affording an opportunity of practically testing the effect of an eastern entrance before taking an irrevocable decision to adopt an entrance facing the north-east. On the other hand, if the plan III, recommended by the committee of 1887, were adopted, it would be necessary to stop all further progress on the northern arm of the Harbour and to proceed at once to clear a north-east

3. I do not now propose to enter upon a discussion of the merits of the different forms of entrance which have been proposed, but I have arrived at the decision communicated to you in my telegram of the 24th December 1888, noted in the margin, that the work of reconstruction should proceed in accordance with the old design, leaving, for further consideration, the exact form of entrance which should be adopted. This decision will, however, finally set aside the plan III, recommended by the committee of 1887.

Telegram to Governor, Madras, dated 24th December 1888.

"Resume harbour works as proposed and prepare abutment blocks. With regard to general scheme despatch follows."

4. I take this opportunity of replying to the 5th paragraph of your Public Works letter, No. 11, of 1st August 1888, submitting a request made by the Trust Board that the rate of interest upon capital advances may be reduced from 4½ to 4 per cent. per annum. This request is one which should be preferred through the Government of India.

From R. W. BARLOW, Esq., C.S., Chairman, Harbour Trust Board, to the Chief Secretary to Government, dated Madras, 11th February 1889, No. 565.

I have the honor to acknowledge the receipt of G.O., No. 174 W., dated 22nd January, which was considered by the Trustees at their meeting held on Friday, the 25th idem, and to submit, for the information of Government, copy of resolution then passed thereon. I also forward extracts from the Engineer's letter, No. 1375, dated 25th January 1889, referred to therein with the extract from a letter to which he alludes, received by him from Mr. Parkes, dated London, 19th October 1888.

2/93

2. I am requested to explain the Board's views as follows:—

(*a*) "That the provision of a new wave-breaker and dredger crane is not at present necessary." The Board await the promised despatch from the Right Honorable the Secretary of State before passing orders for the supply of a new crane.

(*b*) "That the north pier be continued as proposed by Mr. Pogson in his plan IV-A and protected as far as practicable with the appliances at present available."

(1) In his letter No. 1547, dated 12th March 1888, para. 4 (printed in G.O., No. 1624 W., dated 4th June 1888, page 2), Mr. Thorowgood stated that the protection of the piers by 30-ton wave-breaker blocks "is an essential part of the design of the committee presided over by Sir John Hawkshaw. The protective screen should be 40 feet wide at high water level, but with the Titan crane as a setting machine it is impossible to make the screen wider than 28 feet." All work at the north pier being then at a standstill, while the south arm was being pushed forward vigorously, the Board, with the approval of Government (G.O., No. 1624 W.), transferred the wave-breaker crane to the south pier with a view to complete the wave-breaker to full dimension.

(2) Before this could be done, the south arm protected by a wave-breaker screen of only 28 feet has stood the test of two cyclones, and during that of the 13th December 1888, the surf at the south pier is believed to have been as high as any since May 1872.

(3) While still of opinion that a 40-feet wave-breaker is desirable, if not actually essential, the Board have, in view of the experience lately gained at the south pier, determined to continue the extension of the north pier, although until the arrival of a new crane or the re-transfer of the "wave-breaker" only 28 feet of wave-breaker protection can be put in.

(*c*) "That as under design IV-A no buttress is required, no abutment blocks should be made."

(1) In G.O., No. 3644 W., dated 17th November 1888, the Right Honorable the Governor in Council directed that the papers in connection with Mr. Pogson's plan IV-A should be submitted to the Secretary of State for decision; His Excellency also remarked further that the plan proposed is in accordance with Mr. Parkes' suggestions.

(2) These suggestions are understood to be those in reference to an eastern opening. The Board would point out that Mr. Pogson's plan will demonstrate, as it progresses, "what the Harbour will be when completed" with an eastern entrance (*vide* Engineer's letter No. 909, dated 1st October, paras. 9 and 27), and if the Trustees are then satisfied that their Engineer's proposals (para. 5 of his letter) will meet the requirements of the port, they will be only too happy to effect the saving pointed out by him in para. 18 as then possible. The buttress, however, is not required for Mr. Pogson's design, but it is an essential part of Mr. Parkes' plan A, a tracing of which was received with the Right Honorable the Secretary of State's despatch in the Public Works Department, No. 11, dated 15th December 1887. This plan has already been fully considered and rejected, and the Board must therefore decline to sanction the alteration of the moulds, or the making of special blocks which are not required for the design which has been approved, but for another, which, in their opinion, is in every way inferior to IV-A.

(3) I submit, for the information of Government, tracing of the design forwarded by Mr. Parkes for this abutment and would remark that, as the extreme overhang of the Titan crane is only 22½ feet, blocks

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A to A-7 cannot be set with the Titan at A (*vide* concluding paragraph of extract from Mr. Parkes' letter herewith and para. 7 of Mr. Pogson's letter No. 1375, dated 25th January 1889).

(4) The Board have not detailed fully their objections to Mr. Parkes' plan A, but I may mention that, as his proposed north pier head would stand in only 7 fathoms of water, where the surf breaks in rough weather, no vessel could safely approach the entrance broadside on during the north-east monsoon, or at any other time during the prevalence of a heavy swell.

(*d*) "That the Board's Engineer will receive all his orders from the Board * * "

(1) I am requested to invite the attention of Government to para. 6 of the despatch of the Right Honorable the Secretary of State, No. 4, dated 7th June 1888, where his Lordship directed "that in no case will orders be given by or from Mr. Parkes."

(2) Mr. Parkes contends in his memorandum, communicated under G.O., No. 3919 W., dated 13th December 1888, that he has never issued any orders to the Superintendent since 1882, but whether his correspondence with the Engineer contains "suggestions," "proposals" or "orders," the Board consider it most undesirable that any "suggestions" or whatever they may be termed, should be made "privately" to their Engineer regarding the construction of the Harbour, for which they are responsible to Government and to the mercantile community in the interests of the trade of the port. They fully recognise the saving of time which may arise from direct communication between Mr. Parkes and their Engineer on matters of detail, but they can see no reason why such communications should not be demi-official and why copies should not be submitted for their information. They have, therefore, given orders to their Engineer to furnish copies of all communications that may pass between him and Mr. Parkes relative to the carrying on of the Harbour works.

(3) The Trustees will pay due attention to any suggestion of Mr. Parkes' which the Right Honorable the Secretary of State may see fit to transmit, but they are strongly of opinion that in the face of His Lordship's despatch, No. 4, of 7th June 1888, Mr. Parkes was not justified in transmitting direct to the Board's Engineer a design for an abutment intended for a plan disapproved by the Board, and which far from being a matter of detail regarding the "sanctioned design" vitally affects the principles upon which reconstruction has been sanctioned by the Right Honorable the Secretary of State; would leave a weak spot in either the eastern entrance design or design IV-A; and is apparently intended to make provision in advance for forcing upon the Board a design which, so far as the Trustees are aware, is approved of by no Engineer except Mr. Parkes himself and which would probably have been condemned, even upon nautical grounds, by the committee which approved of plan III (upon such grounds only) had his proposals been placed before them, at any rate it has not been approved upon these grounds; and the Board, after further careful consideration, are still unanimously and very strongly of opinion that the eastern entrance should be proceeded with tentatively as provided in design No. IV-A, which has, as Government have already been informed, in my letter No. 2685, dated 19th October 1888, received the approval of Sir Guilford Molesworth, who proposed plan IV in July 1883 and suggested a modification in his note, dated Simla, 5th May 1888 (printed in G.O., No. 2335 W., Public Works, dated 1st August 1888). The question whether an east or a north-east entrance according to design IV-A be finally adopted should be left for the decision of the Board, subject to the approval of Government, after "what the Harbour will be when completed" with an eastern opening has been demonstrated.

3. In conclusion the Board would strongly urge the great expense incurred by constant delays, and they trust that having fully met Mr. Parkes by agreeing to give the eastern entrance a practical trial, he will refrain from bringing forward any other modified form of north-east entrance; any possible advantage in which over design IV-A, should such exist, would be bought at too great a price, if delay and discussion have again to be entered upon.

ENCLOSURES.

Extract of letter No. 1375, dated 25th January 1889.

From A. LEE POGSON, Esq., Engineer, Harbour Trust Board, to the Chairman, Harbour Trust Board.

I have the honor to acknowledge the receipt of your letter, forwarding a telegram from the Secretary of State, dated 24th December 1888, received on these works on 23rd instant.

2. * * * *

3. In my letter No. 909, dated 1st October 1888, paras. 9 and 21, I stated that a new wave-breaker crane would be required immediately to protect *any length* of pier I may be able to build this season, and I now have to point out to relieve myself of all responsibility that the present Titan crane can only deposit the wave-breaker to a width of 24½ feet, which is not sufficient to protect the new work (*vide* Board's Proceedings, dated 6th April 1888, communicated with Chairman's letter No. 113, dated 10th April 1888, *under any design* and referred to in para. 8 of Mr. Thorowgood's letter, No. 50, of 12th April 1888).

4. * * * *

5. Accompanying this letter are all the *instructions* I have received *direct* from Mr. Parkes, with tracings, &c., regarding the buttress and making of the special blocks, and, I presume, the telegram—"Prepare abutment blocks"—is intended to confirm the instructions Mr. Parkes has given me, but before commencing the alteration to the moulds, I have to ask that the Trustees will confirm these instructions and give me *direct orders*, as from para. 6 of G.O., No. 2065 W., dated 9th July 1888, I understood Mr. Parkes would not under any conditions issue orders direct to the Engineer, Harbour Trust Board, but this has been done and is now apparently confirmed by the telegram from the Secretary of State.

6. This state of affairs is most confusing and places me in a false position, so that I now beg that the Trustees will definitely decide from whom I am to receive orders. The Trustees have condemned plan A; Mr. Parkes' instructions regarding the abutment can only be ordered with a view to the ultimate adoption of his plan A in the event of a north-east entrance to the Harbour.

7. The tracing of the abutment supplied by Mr. Parkes shows the "range of Titan from A," viz., centre of blockings, as 24 feet. To make certain whether this abutment could be built in accordance with his instructions, I yesterday measured the exact range of present Titan crane from the centre of the blockings to the diving-bell girder and find the *extreme travel* or overhang to be only 22′ 6″.

8. * * * *

With reference to the abutment mentioned in the telegram from Secretary of State, in a letter received from Mr. Parkes, dated 19th October 1888, speaking of the north-east entrance (plan A), Mr. Parkes says:—

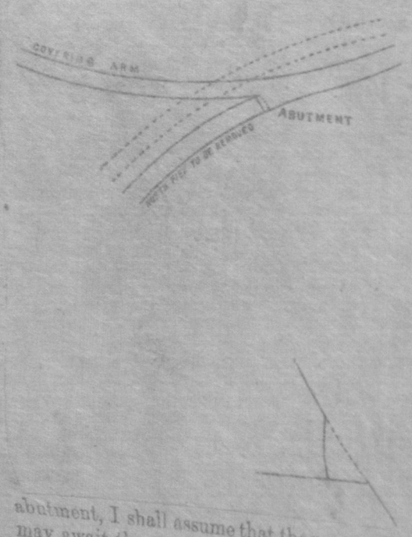
* * * * *

"I don't think, however, if as I expect plan A is substantially adopted, there is room for much difference of opinion as to the mode of carrying it out.

"If you get early orders to proceed you will be able to begin building in January, and there will be about *250 feet* to build which will have to be taken up again. This should be finished by the end of February or early in March, and you will then begin upon work which is to be permanent. This permanent work ought to start with a special abutment for the slopping work to lean against, and as this will require some special blocks, these blocks should be put in hand as soon as you get orders, in order that they may get their three months' hardening.

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I, therefore, enclose you a tracing of the abutment I would suggest. The position will be somewhere as shown, but the exact position need not now be determined as the blocks will come in anywhere on the curve, and we are waiting to hear what the Board have to say before finally deciding the exact form.



"Most of the blocks are so arranged that they can be made in the ordinary moulds only with the lewis holes made vertical instead of sloping. There are 11 of special form (or rather 11 pairs), but these can all be made with slight additions to the inside of the moulds, if you take a little excusable latitude in cutting off a toe where it protrudes. If you can easily manage without this, however so much the better. The cross section will be just the same as for the ordinary work, but the mortises and tenons will be parallel to the beds of the blocks, so that each course will show three ridges on the top bed into which three corresponding chases on the bottom bed of the course above will fit. The vertical system of joggles will not be applicable.

"Now if I find that the orders to be given are of a nature which will include this abutment, I shall assume that the preparation of the blocks will be put in hand. All other details may await the result of further information.

"I think the tracing will speak for itself. You will understand that blocks A—A-7 are to be set from the Titan when at A and the same with other letters. Thus there will always be a complete row in advance of the row on which the Titan blocking stands."

* * * * *

Extract of Proceedings of the Trustees of the Harbour of Madras, at a meeting held at the offices of the Board, on Friday, the 25th day of January 1889.

* * * * *

Read—G O., No. 174 W., dated 22nd January 1889, communicating telegram, dated 24th December 1888, from the Secretary of State directing the resumption of work at the northern arm of the Harbour as proposed, and directing provision to be made for abutment blocks.

Read—letter No. 361, dated 23rd January 1889, from the Chairman, to the Board's Engineer, directing him to proceed at once with the extension of the northern arm, as proposed by him in his plan No. IV-A.

Read—the Engineer's reply, No. 1375, dated 25th January 1889, enclosing an extract from a letter, dated London, 19th October 1888, received by him from Mr. Parkes, forwarding a sketch of the "abutment blocks" referred to in the Secretary of State's telegram read above.

Read—again portions of the Engineer's letter, No. 909, dated 1st October 1888; Board's Proceedings, No. 2, dated 6th April 1888; portions of letters from the Board's late Engineer, No. 1630, dated 28th March, and No. 50, of 12th April 1888; G.O., No. 1624 W., dated 4th June 1888; despatch from the Right Honorable the Secretary of State, No. 4, dated 7th June 1888; G.O., No. 2335 W., dated 1st August; and No. 3644 W., dated 17th November 1888.

Examined—plan No. IV-A, submitted by Mr. Pogson, and unanimously approved by the Board at their meeting of the 5th October 1888, and Mr. Parkes' plan A which accompanied the Secretary of State's despatch No. 11, dated 15th December 1887.

Resolved unanimously—

(*a*) That the provision of a new wave-breaker and dredger crane is not at present necessary.

(*b*) That the north pier be continued as proposed by Mr. Pogson in plan No. IV-A and protected as far as practicable with the appliances at present available.

(*c*) That, as under design IV-A no buttress is required, no abutment blocks should be made.

(*d*) That the Board's Engineer will receive *all* his orders from the Board. He is referred to para. 6 of the despatch of the Right Honorable the Secretary of State, No. 4, dated 7th June 1888, directing "that in no case will orders be given by or from Mr. Parkes."

(*e*) That the Chairman be invited to address Government and further explain the Board's views.

* * * * *

Transferred with Mr. Barlow's demi-official of the 12th instant to the Public Works Department.

(By Order.)

(Signed) W. S. MEYER,
Assistant Secretary.

15th February 1889.

ORDER—dated 2nd March 1889, No. 622 W., Public Works.

The Right Honorable the Governor in Council regrets that, notwithstanding the orders from the Secretary of State, the Harbour Trust has declined to sanction the making of the special blocks, which will be required should Mr. Parkes' proposal be carried out.

2. This refusal compels His Excellency the Governor in Council to point out to the Harbour Trust Board that the supply of public money for the Harbour must be contingent on immediate and complete compliance on their part with any orders which may be issued as to constructive work by the Right Honorable the Secretary of State or the Government. The Government desire that the special blocks ordered by the Secretary of State be put in hand without further delay.

3. This measure will in no way necessitate the adoption of Mr. Parkes' proposal and should the abutment not be required, the blocks can be utilised in the wave-breaker.

4. The Government approve of the Board's proposal to continue the extension of the north pier sanctioned by the Secretary of State with 28 feet of wave-breaker protection only for the present, but on no account are wave-breaker blocks to be put down on the north pier at the place where the north pier would have to be taken up should Mr. Parkes' proposals be carried out.

5. The Government will not enter on a discussion of the merits of the two proposals now before the Secretary of State, namely, Mr. Parkes' plan and plan IV-A, recommended by the Harbour Board. The former is a modification of plan I and the latter of plan IV of the proposals of the north-east entrance attached to the report of the Special Committee (G.O., No. 3484 W., dated 20th December 1887).

(True Extract.)

(Signed) H. R. MEAD, Colonel, R.E.,
Ag. Secy. to Govt., P.W.D.

To the Chairman, Madras Harbour Trust Board.
" Marine Department.

Exd. A. D. Xavier.
Spare Copies

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BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1889} Madras.

PUBLIC WORKS.

Dated March, 2nd.

Recd. *Encl.*

G.O., 2nd March 1889, No. 622 W.

MARCH.

Madras Harbour

Passing orders on correspondence relating to proposals for completing the —.

219.3

PUBLIC WORKS DEPARTMENT.

LETTER—to

THE RIGHT HONORABLE THE SECRETARY OF STATE FOR INDIA.

MY LORD,

We have the honor to forward, for your Lordship's information, our Proceedings No. 622 W., dated 2nd March 1889, regarding your despatch No. 2, dated 24th January 1889.

2. We regret that there has been delay with regard to the preparation of the abutment blocks ordered in your telegram, dated 24th December, but your Lordship will observe that we have ordered them to be prepared without further delay.

3. We hope, since it has been decided that the work of reconstruction should be continued for the present at least on the lines of the sanctioned design, that the works will be carried on with vigour, but we must urge the importance of a speedy decision as regards the form which the north-east entrance, if such is adopted, should eventually take.

4. We observe that there are now practically only two plans before your Lordship, viz., Mr. Parkes' proposal and that forwarded with our despatch, dated 17th November 1888, the first by a modification of plan I, the second of plan IV of the proposals considered by the London Committee.

We have the honor to be,
My Lord,
Your Lordship's most obedient, humble servants,

(Signed) CONNEMARA.
(„) H. E. STOKES.
(„) J. H. GARSTIN.

FORT ST. GEORGE,
2nd March 1889.

Exd. A. D. Xavier.

GOVT. OF MADRAS.

PUBLIC WORKS DEPARTMENT.

(Copy.)

LETTER to the Right Honorable the Secretary of State for India.

No. 7/622 W., dated 2nd March 1889.

Forwarding copy of Proceedings of Government regarding the Madras Harbour and requesting early orders as to the form which the north-east entrance, if such is adopted, should eventually take.

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GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

READ—the following papers :—

From R. W. BARLOW, Esq., C.S., Chairman, Harbour Trust Board, to the Chief Secretary to Government, Marine Department, dated Madras, 12th March 1889, No. 969.

I have the honor to acknowledge the receipt of G.O., No. 622 W., dated 2nd instant, and to submit herewith, for the information of Government, copy of resolution passed thereon by the Board at their last meeting, together with a copy of their Engineer's letter No. 1558, dated 8th instant, referred to therein, also the tracing which was not received until to-day ; hence the delay in transmitting the resolution.

2. The very early orders of Government are solicited as the trustees consider it is unsafe to leave the newly built portion of the north pier unprotected, and are of opinion that it would be better to proceed according to the sanctioned design, which their Engineer informs them was, he believes, Mr. Parkes' intention.

ENCLOSURES.

EXTRACT of Proceedings of the Trustees of the Harbour of Madras, at a Meeting held at the offices of the Board on Friday the 8th day of March 1889.

* * * *

8. Read G.O., No. 622 W., dated 2nd March 1889, passing orders on correspondence relating to proposals for completing the Madras Harbour.

Read minutes by Captain H. A. Street, H.M.'s I.M., Mr. F. B. Hanna, M.I.C.E., and the Chairman.

Read letter from the Engineer, Harbour Trust Board, No. 1558, dated 8th March, in reply to a reference made to him on the subject.

Resolved (*a*) that the Engineer's letter be forwarded to Government.

(*b*) That the abutment blocks ordered by the Secretary of State be commenced at once ; but as they will not be ready for use for some months, that Government be asked to sanction their being placed in the position recommended by the Engineer, which is approved by the Board, as otherwise the work at the north pier will have to be stopped.

(*c*) The Board consider it would be very unsafe to leave, without wavebreaker protection, that portion of the north pier which was most injured before, and they therefore invite the serious attention of Government to the remarks made by their Engineer with reference to that portion of para. 4 of the G.O.

(*d*) Resolved further that the Chairman be invited to address Government and point out that, as both questions demand an immediate decision, it is hoped that orders may be passed as early as possible.

* * * *

(True Extract.)

(Signed) C. PINSENT,
Secretary, Harbour Trust Board.

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From A. L. POGSON, Esq., Engineer, Harbour Trust Board, to the Chairman. Harbour Trust Board, dated Madras, 8th March 1889, No. 1558.

I have the honor to acknowledge the receipt of G.O., No. 622 W., dated 2nd March 1889, bearing your endorsement No. 851.

2. With regard to para. 2 of the order thereon, I beg to state that I am preparing to make the abutment blocks, but it is impossible to have them ready and hard enough in time to set this season; consequently construction at the north pier will have to be stopped earlier than otherwise necessary; but if it can be decided that the abutment should be "set" in a position so as to admit of as much progress this season as possible, I propose to place it at the *end of the curve* as shown on accompanying tracing of plan A, as all the curve blocks are made, and Mr. Parkes was aware of this, so that I believe his own reason for leaving the fixing of the exact position of the proposed abutment to me was so that I could utilize all the curve blocks already made and on hand. Under these circumstances, I have to ask that the trustees will approve of the above proposal whether or not orders are received to set this abutment early next working season.

3. This position of the abutment will not in any way interfere with the general scheme of plan A should it eventually be adopted, and will not only admit of greater progress this season, but utilize all the specially-made blocks now on hand, which will not work in at any other part of the harbour walls.

4. As to para. 4 of the same order, I can only state that I fear the north pier would be breached should a cylone of any importance strike Madras, while this portion of the pier is unprotected with wavebreakers as the old wall is so damaged at this point as to afford very little protection to the new work, especially as both the curves were damaged more severely than any other portion of the works.

5. Further that as (shown on accompanying plan) 346 feet of the 500 feet entrance had already been protected with wavebreaker blocks before the entrance, question arose for the second time, and that as these will have to be dredged up if this entrance is to be carried out, it will make very little difference whether the wavebreakers have to be raised *all along* this entrance; while, with a portion unprotected and possibly breached, the cost of rebuilding this injured new work would exceed the cost of removing the wavebreakers, I am now prohibited from putting down which, I am sure, *Mr Parkes never intended to be left unprotected*, and which is a distinct departure from the sanctioned design.

6. This question of protection requires a decisive decision *before* the 1st of April.

7. In my letter No. 909, dated 1st October 1888, para. 27, I proposed to leave the last 500 feet of the north pier unprotected with wavebreakers, and I fear this suggestion has led to the proposed deviation from the sanctioned design at the north pier curve, but I must here point out that there can be no comparison made between these two points, viz., the old north pier head and the north pier curve. The former is standing intact to mean sea level, and will be a strong wavebreaker in itself, while at the latter the old wall has been overthrown down to the lower blocks, so that the new work would have to stand the *full force* of the sea, just as the original section was expected to, but which so utterly failed.

8. This morning I went down myself in a diving dress and examined the old and ruined north pier; and from what I saw, I consider the north pier curve would be *positively unsafe* unless protected with a wavebreaker *not less than* 28 *feet wide*; and unless this protection is allowed to be added, I must ask that the trustees will give me a clear certificate acquitting me of all blame and responsibility should this pier be damaged during any cyclone.

9. If the trustees are prepared to accept the risk of further damage to the superstructure at this corner of the harbour, I would then *beg* that I may be *allowed* to "set" the wavebreaker blocks with Lewises, leaning against the north side of the wall, in single file, five courses deep, which will add 9 feet to the width of the superstructure. These blocks so "set" can be taken up whole and uninjured just as the superstructure will have to be, should Mr. Parkes' plan A eventually be adopted, but I cannot recommend this alteration.

Transferred to the Public Works Department.

(By order.)

14th March 1889.

(Signed) W. S. MEYER,
Ag. Under-Secretary.

Note by the Chief Engineer, Public Works Department, dated Madras, 16th March 1889.

There are two points brought forward in the papers forwarded by the Chairman of the Harbour Trust Board—

(1) The length of the extension of the north pier that may be proceeded with now.

(2) Whether this extension should be left for the present without the protection of wavebreaker blocks.

2. With regard to the first point, I see no objection whatever to Mr. Pogson's proposal that the north pier should be continued as far as the end of the curve, that is, to 2,858 feet from the starting point of the north pier. This is the spot where, should the abutment blocks (ordered to be made) be put down, they will probably be placed so as to form the root for the extension of the pier northwards forming the overlap of the entrance, should hereafter the late Mr. Parkes' proposal be carried out.

3. The second point is more difficult to decide, but the following are the facts of the case. The north pier was completed up to 2,526 feet from the starting point by December 1886, and this length has been protected with wavebreaking blocks. The north pier work was resumed on the 1st February 1889, and by the 9th March was completed up to 2,715 feet. This work is now going on and it is proposed to extend it to the end of the curve or to 2,858 feet. Should plan I of the proposals considered by the London Committee or any modification of it be hereafter adopted, it will be necessary to remove all the work put down from 2,180 feet to 2,858 feet, and of course the removal of the wavebreaker blocks in this portion of the work will be a most serious undertaking. We shall have (if this entrance is adopted) in any case to remove them for 346 feet (that is, from 2,180 to 2,526 feet) as they are already put down, but it was considered advisable in the case of this form of entrance being ordered not to place wavebreaker blocks for 332 feet, that is, from 2,526 to 2,858, and it was believed from the plans that the remains of the old north pier ruined in the cyclone of November 1881 would be sufficient protection for this length of new pier, and Government directed that wavebreaker blocks should not be put down.

4. Mr. Pogson, the Engineer for the Harbour Trust Board, reports in para. 7 of his letter that at the curve "the old wall has been overthrown down to the lower blocks," and that therefore little or no protection can be hoped for from it. This is not as shown in plans, where it is stated that on the worst place in the curve there are "two courses gone at least."

5. This morning I met Mr. Pogson and went over the north pier work with him, and after inspection I agree with that officer that it is advisable that this portion of the pier wall should not be left in May when cyclones are not unusual without protection, and therefore I recommend in place of, as proposed by Mr. Pogson, one row of wavebreaker blocks being "set" with Lewises on the north side of the wall, that two rows should so be placed, and, as stated by that officer, "these blocks so 'set' can be taken up whole and uninjured just as the superstructure will have to be," should plan I or any modification of it be adopted.

6. Should it be finally determined that this plan be not adopted (and I trust before long a final decision will be arrived at), it will be advisable for the upper courses of these wavebreaker blocks to be taken up and placed in "Random." Also that additional wavebreaker blocks be put down and the 28 feet of wavebreaker protection be completed before the north-eastern monsoon, say before the 15th October 1889. I therefore propose that the Madras Harbour Trust Board be authorised and requested as soon as practicable to place two rows of wavebreaker blocks on the north side of the extension of the north pier beyond, where it is already protected by the 28 feet width of wavebreakers, and to extend the north pier as far as they can this season with this protection, but that it should not be carried on beyond the end of the curve until the question of putting down the abutment is settled. There is a further reason for this proposal, namely, that space for the storage of wavebreaker blocks is wanted, and it is therefore of importance that the wavebreaker blocks that are ready for use (three months old) should be moved from the ground and the space now occupied by them be made available for new blocks.

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ORDER—dated 19th March 1889, No. 821 W., Public Works.

The note by the Chief Engineer is forwarded for information to the Harbour Trust Board, and they are authorised to carry on the north pier as far as they can this season with the protection as proposed.

(True Extract.)

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

To the Chairman, Madras Harbour Trust Board.
" Marine Department.

Exd. J. Henricus.
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BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1889} Madras.

PUBLIC WORKS.

Dated March, 19th.

Recd. *Encl.*

G.O., 19th Mar. 1889, No. 821 W.

MARCH.

Madras Harbour Works

Note by the Chief Engineer, Public Works Department, on the question of continuing the north pier with [illegible] works, communicated to the Harbour Trust Board.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

2193

Buildings and Roads.
Civil Works.

READ—the following paper:—

From R. W. BARLOW, Esq., C.S., Chairman, Harbour Trust Board, to the Chief Secretary to Government, Marine Department, dated Madras, 13th April 1889, No. 1404.

Referring to G.O., No. 821 W., dated 19th March, I have the honor to forward herewith copy of a letter from the Board's Engineer, No. 51, of 11th instant, and to solicit the favor of very early orders.

ENCLOSURE.

From A. L. POGSON, Esq., Engineer, Harbour Trust Board, to the Chairman, Harbour Trust Board, dated Madras, 11th April 1889, No. 51.

In accordance with your letter No. 902, dated 7th March 1889, I have the honor to inform you that the special abutment blocks required for Mr. Parkes' plan A, 44 in number, were made and completed on the 7th instant. If the abutment is to be "set," work at the north pier must be delayed for one month to allow these blocks the usual three months' hardening. Under these circumstances, I have to ask for an early decision to be arrived at, and that I may receive instructions before the end of May.

Transferred to the Public Works Department.

(By order.)

23rd April 1889. (Signed) W. S. MEYER,
Asst. Secretary.

ORDER—dated 29th April 1889, No. 1139 W., Public Works.

The blocks should be allowed the usual time to "set" before they can be placed in position. It is expected that before this time elapses, the Secretary of State's decision as to the further prosecution of the work will be communicated.

(True Extract.)

(Signed) R. R. E. DRAKE-BROCKMAN, Lt.-Col., R.E.,
Ag. Joint Secy. to Govt., P.W.D.

To the Chairman, Harbour Trust Board.
" Marine Department.

45

Exd. J. Henricus.
Spare Copies

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1889} Madras.

PUBLIC WORKS.

Dated April, 29th.

Read. *Encl.*

G.O., 29th April 1889, No. 1139 W.

APRIL.

Madras Harbour

Orders on letter from the Chairman, Harbour Trust Board, requesting orders in regard to the setting of the special abutment blocks.

F C¹ 2193

Class 1 | INDIAN TELEGRAPH. | Local No. 1203

To

(Station) Ootacamund | From (Station) Madras

Words.	Day.	Hour.	Minute.	Official Instructions.
45	29	9	56	

To (Person) | From (Person)

Hon bble H. E. Stokes Madras
wire.
Inspected north arm this
morning abutment as proposed
by parker not required.
Old breakwater if built
upon prevent Easterly
Any point and wall 46
Carried on if north east
entrance ultimately decided upon
Cut blocks do not afford
sufficient protection against
undermining of rubble base
proposal Lane Sup. Colonel
Roads note sixteenth march
should be carried out please wire

RECD. FROM | L. N.
AT Hrs. | Mts., By
Date

SENT TO | L. N.
AT Hrs. | Mts., By

OOTACAMUND 22-7-89

Telegraph Master.

46

RATES OF CHARGE FOR INLAND TELEGRAMS.

The address (including name of Sender and name and

Deferred
Ordinary
Urgent
No charge

construction had better be stopped.
Col: Heard will know what
forward to the harbour mouth
Bay the men and material
leaving on the W. prior or for
the world with the protection
as proposed - abutments
they have not acted this
suspension & Col: Drake
Brabazon now says that the
blocks left in regular order
which the current can act
sufficient protection pleas
other line Factor Col:
Heard's suggestion & the
up the water course of this

No 602 Sabeck dated 1st 21/7/87.
Telegram

to Chief Engineer.

Your telegram 29th. The orders for constructing abutment are withdrawn. Inform Chairman. As to ¶ para 6 Col Heard's memorandum your telegram not fully understood We await your return and Explanation. Expedite return

J.C.S

Passed in Council
9th Aug. J.C.S

4887

14

RATES OF CHARGE FOR INLAND TELEGRAMS.

The address (including name of Sender and name and residence of Addressee) is transmitted free.

	First 8 words.	Each additional word.	
Deferred Message	... 8 Annas	... 1 Anna.	A group of 5, or less than 5 figures, is reckoned as one word.
Ordinary "	... 1 Rupee	... 2 Annas.	
Urgent "	... 2 Rupees	... 4 Annas.	

No charge for delivery within a distance of 5 miles.

193

GOVERNMENT OF MADRAS

as the Chief Engineer now advises that the abutment is unnecessary I don't object to withdraw the orders for its construction.

With regard to the orders asked for about Col. Mead's suggestion, I do not understand what is wanted. Col. Mead's suggestions have been already approved in Co. O. 19 March 89 No 821 W.

Hlf
30 July.

When the paper came round before I expressed my opinion that the building of the abutment was a mistake as the Chief Engr now says it is not wanted.

47

No 511

From

The Engineer
Harbour Trust Board
Madras

To

293

Sir Richard Barlow Bart C.S.I.
Chairman Harbour Trust
Board Madras

Madras, 26th July 1889

Sir

With reference to telegram No. 07302 dated 20th instant from Government ordering the abutment to be left, I have the honor to inform you that at 2 P.M. this day the Sea became calm enough for the first time, since 8th July 1889 to allow a Diver to remain below; also that I have commenced to level up the base ready for the abutment blocks which will be set as soon as the weather permits.

I have &c
(Signed) A. Lee Pogson
Engineer, Harbour Trust Board

True Copy
5E 49

Secretary
Harbour Trust Board

HARBOUR TRUST BOARD
29 JUL 89

P.W. Department

No 602 Dated 31st July 1889

Telegram. Urgent State.

2193

From I.

To W.

Your telegram 29th × The orders for constructing abutment are withdrawn × Inform Chairman × As to para 6 Colonel Meade's memorandum your telegram not fully understood we await your return and Explanation × Expedite return ×

Desp. 31. VII. 89.

(Signed) G T Walker

I

50

48

No. 3065 W dt. 1. 10. 88.

19/3068 W " 1. 10. 88

3644 W " 17. 11. 88

24/3644 W " 17. 11. 88.

3919 W " 13. 12. 88

7/622 W " 2. 3. 89.

622 W " 2. 3. 89.

821 W " 19. 3. 89

1134 W " 29. 4. 89.

1492 W/A " 6. 6. 89

1583 W " 17. 6. 89

1737 W " 1-7-89

1995 W " 24. 7. 89

5488 " 20. 7. 89

No. 602 D of 31st July 1889

To W

Submitted with reference to the Hon: Member's telegram of 31-VII-89.

R.B.

Seen
Rtd
5.8.89

Harbour Trust Board Office,

MADRAS, 29th July 1889.

No. 2686

From Sir Richard Barlow Bart CS

Chairman, Harbour Trust Board,
MADRAS,

To 2193
The Honorable A. J. Price CS

Chief Secretary to Government,
Marine Department.

Sir

I have the honour to submit for the information of Government copy of a letter No. 511 dated 26th instant, from the Board's Engineer, reporting that the sea was, on the afternoon of that date, smooth enough for the first time since the 8th instant, to permit a diver to remain below, and that he had at once commenced to level up the brace with a view to setting the

69 51 69 abutment

abutment blocks as ordered.

I have the honor to be
Sir
Your most obedient Servt.

[illegible]
Chairman
Harbour Trust Board

P.S. see

193

193

57

Br. Cir. No: 74

a

No 602 Ⓓ - 31.7.89.

C

No 10
27.8.89
Ex pilot
No 2193 W d/12 "Aug

Recorded with
remark that the
orders for letting
abutment have
been withdrawn

(57) Recorded

Rules
8.

To The Chairman H.B.
Marine Dept.

R.S.

Please return G.O.
of Government

SHC

7.8.89

MARINE DEPARTMENT.

FROM

THE CHAIRMAN,

HARBOUR TRUST BOARD,

MADRAS.

To

THE CHIEF SECRETARY TO GOVERNMENT,

Marine Department.

CHIEF SECRETARY 31 JUL 89 GOVERNMENT OF MADRAS

DATED 29 } July 1889
RECEIVED 31 }

ENCLOSURE (1)

No. 2686

No 2193 W d/12 "August 1889

SUBJECT.

Submitting for the information of Govt. Copy of the Board's Engineers letter No 511 dated 26 July 1889 regarding abutment.

Transferred to the Public Works Department

SECRETARY TO GOVERNMENT 7 AUG. 89 P.W. DEPARTMENT, MADRAS.

for Secretary

Assistant Secretary

7.8.89