(1) பக்கங்களின் எண்ணிக்கை -௫௪-
(2) புதுக்கித் திருப்பிய நாள் 23. 7. 90
(3) ஆதாரங்குறிப்பவர் சுருக்கொப்பம்

தமிழ்நாடு ஆவணக் காப்பகம்.

தமிழ்நாடு அரசு

P.W.D துறை

.109

அரசாணை எண். மு. கோப்புத் தாள் எண்.	426	அச்சகம் பலவகை
நாள் :	16-2-1891	~~198~~.

மடிக்கவோ கண்டபடி கையாளவோ கூடாது

27 Sheets

26+1 Statmt

ஆவண. கா-1—18,006—15-6-87.

16TH FEBRUARY 1891, No. 426 W., PUBLIC WORKS.

426/1

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

READ—the following papers:—

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, 31st December 1890, No. 2 (Public Works).

Madras Harbour Works.

In continuation of previous correspondence relative to the work of restoring the Madras Harbour, I now forward, for Your Excellency's information, copy of a report * on the subject which has been drawn up by Sir Alexander Rendel.

* Dated 28th November 1890.

2. Most of the recommendations made in this report were contained in the Minute read by Sir Alexander Rendel before the Harbour Trust Board during his visit to Madras in February last, and have already received the notice of your Government.

3. In the latter portion of the report the erosion of the shore north of the works is referred to as the gravest matter relating to the harbour at present; and I notice, from your Public Works letter No. 13, dated 19th September 1890, that a reference has been made by the Trust Board to your Government on the subject. I shall be glad to be furnished with a report on the result of this reference, as well as with the views of your Government on Sir Alexander Rendel's recommendations generally.

ENCLOSURE.

Report by Sir Alexander Rendel.

A few days after my arrival in Calcutta in February last, some papers relating to Madras Harbour were forwarded to me by the Government of India, together with a telegram from the Secretary of State requesting the Government to consult me upon them.

The papers comprised observations by the Harbour Board, generally unfavorable, on my report to the India Office on the harbour, dated 16th April 1889, and despatches from the Government of Madras and the Government of India accepting the views of the Harbour Board.

It so happened that there appeared to be just then a pause in my share of the actual business which took General Strachey and myself to India, sufficient to allow of my visiting Madras, and I availed myself of the opportunity, arriving in Madras on the 23rd February. I stayed there three days, and having carefully examined the works of the harbour and discussed the situation of its affairs with its Engineer, Mr. Lee Pogson, I drew up a note upon the conclusions I had arrived at, which I read to the Trustees at a meeting summoned for the purpose. I have appended a copy of the note to this report, and it will be also found attached to the despatch of the Government of India, dated 23rd June last.

The recommendations I made in this note were generally the same as those which I had made in the report before mentioned, with the exception that I did not raise the question of the entrance. On this subject I was silent, because I found that the Trustees held a very strong opinion that an eastern entrance was a mistake, that it would have to be replaced by an entrance at the north-eastern angle of the harbour, and that they were entirely opposed to the view which

I had expressed in my report, that the proper remedy for such troubles as attached to an eastern entrance was the construction of inner works converting the harbour into an inner and an outer harbour.

It was evidently as useless as it was fortunately unnecessary then to discuss this question. It had been decided to form the eastern entrance, and to defer further discussion upon its merits or demerits until experience of it had been obtained, and this was a course with which I could not but concur, because the eastern entrance, being a part of my scheme, its completion was at least as great an advance towards the adoption of my views as of those of the Trustees.

I therefore confined myself to details connected with the construction of the breakwaters on the present plan, and I am glad to say that here the Trustees accepted my views. They agreed to the entrance being made 500 feet wide instead of 450 feet, to which it had been previously intended to reduce it from the 550 feet originally proposed. They assented to the heads, together with the outer ends of the breakwater walls being founded at greater depths than had been intended, and to the southern head being formed of a mass of concrete in an iron caisson. They also assented to the wavebreaker blocks being thrown in on a propile measuring 40 feet wide at the top, where it had been previously proposed that the width should be only 28 feet, and they agreed to the paving of the rubble substructure on which the walls of the breakwaters stand being paved inside the harbour with concrete *in situ*; and, as my advice appears to have been acted on, the Government of Madras has approved the proceedings of the Trust.

So constructed, I think the works will be secure from such cyclone waves as, from all I can learn, have to be encountered at Madras; and if, in addition, the walls of the breakwaters be raised when the rest of the works are complete, say 6 feet higher than at present, I believe that waves will be so far kept out of the harbour as to make it a safe anchorage under all ordinary circumstances.

I should add, that I advised the Trustees to purchase a new titan crane and a steam launch for the use of the Engineer. The former is necessary for the convenient deposit of the outer wavebreaker blocks, and will be useful afterwards as a crane for the unloading of heavy weights. The latter is necessary to allow of the Engineer taking current soundings and other observations. All he has at present is an open row boat, which is quite ineffective for the purpose. Both crane and launch are now in course of being built.

I look forward, therefore, to the harbour being completed on the design now sanctioned for a sum not greatly beyond the present sanction, because I understand that the sanctioned estimates include the widening of the wavebreaker block work to 40 feet.

But the expenditure upon it will not, in my opinion, end with the completion of the present scheme. A mere harbour of refuge is not wanted at Madras. What, it seems to me, is wanted there is a good commercial harbour, and a commercial harbour in which vessels discharge goods into or load up goods from boats which themselves load and discharge on a foreshore of sand is not worth the name,—at any rate, is not worth the sum which will have been spent on Madras Harbour by the time it is finished on even its present plan.

The Harbour Trust seems to consider that there is at present no demand at Madras for anything better; and as long as it is of this opinion, and until, in fact, the questions relating to the entrance are settled, it appears useless to discuss the subject. I will only say now upon it that I have so far seen nothing to change the views I expressed in my report before referred to.

As is well known, the shore line outside the harbour has advanced considerably on its south side, and receded as considerably on its north side.

I do not think the advance on the south side threatens to diminish the depth at the entrance of the harbour. It results more from the steepening of the slopes of the shore than from their growth seawards. Nor do I think that there is danger of the harbour itself silting up in a manner which cannot be easily coped with in the ordinary way; but the receding of the shore on the north side is a more difficult matter.

Already the shore for the distance of about a mile north of the harbour has been eaten into so seriously that a large sum has had to be paid in compensation for the loss of land, and a considerable expenditure has been, and is still being, incurred in depositing stone along the shore in the hope of stopping further depredations, and I regret to see by the papers attached to the despatch from the Government of Madras to the Secretary of State, dated 19th September last, that the mischief is not yet stopped, and that the Trustees are asking for further advice upon it. Madras has the disadvantage of having practically no tidal rise, so that there is but little slope to be paved, where paving is so useful, I mean between low and high water mark. All that can be done is to throw in hard material so that it may be dragged down by the sea at its pleasure. If this process be unsuccessful, as I feared it might be when I was on the spot, it may be necessary to deposit a line or lines of large blocks of concrete somewhat similar to the wavebreakers used outside the breakwaters along, and probably also at right angles to the shore, at of course a heavy expense. This matter is, in my opinion, the gravest relating to the harbour at present. The opinion asked for by the Trustees in the papers on this subject to which I have referred will no doubt be shortly forthcoming, and will give us the views of the Chief Engineer of the Madras Presidency upon it. I should add that I think the plan sent home with the quarterly reports should show that part of the shore which the sea has attacked and the stone deposits and other works by which the action of the sea is being held in check.

I have, in conclusion, to state that this note has been delayed first, because, expecting that the printed proceedings of the Trust would have reached England at a much earlier date than they did, I had left my own copy of the note I had read to the Trustees with the officers of the Government in Calcutta; and 2nd, because I have been expecting that revised estimates would be sent home providing for the works I had recommended. These estimates have not yet reached me. The works, I may mention, appear from the quarterly returns lately sent home to have made good progress since my visit, and I may be allowed to add that the present arrangements as to engineering seemed to me to be quite satisfactory.

(Signed) A. M. RENDEL.

28th November 1890.

MEMORANDUM.

The undersigned has intentionally delayed expressing any opinion on the subject of the erosion of the shore to the north of the Madras Harbour until after the close of the north-east monsoon.

2. After full consideration of the matter, he is of opinion that no better course can be adopted than to continue the present revetment to a further length of about eight hundred yards (northwards) and then stop all attempts at protection, accepting the fact that a certain amount of erosion must take place.

3. It appears certain that wherever the revetment ends the eroding action of the sea will form a bay of more or less extent, and that the only effect of extending the revetment northwards is to move to the north the position of this bay; that it can be prevented from forming somewhere the undersigned does not believe, at all events by any measure short of extending the revetment to the Ennore bar.

4. The extension proposed is recommended because the present revetment just stops short of some valuable buildings which will probably be destroyed in a couple of years more if no further protection is provided. Eight hundred yards to the north the land is much less valuable, and it does not seem probable that anything would be gained by any further extension.

5. What the ultimate extent of the erosion will be, or in other words what will be the ultimate area of land removed, the undersigned cannot pretend to say; that it will have a limit is certain, and that when this limit is reached the coast will begin to advance again, and a portion of the land eroded be recovered, is by no means improbable.

6. The undersigned agrees with Mr. Pogson in considering that the extension of the revetment should not be in line with that already completed, but somewhat to the rear (west) of it. Probably about the line of the present high-water mark would be the best position; there is no particular object in putting it too far to the east, as the ground gained would not be worth much, and the higher it is the easier it will be to construct and maintain.

7. The end of the present revetment should be finished off with a good mass of stone; ultimately it will probably have to be connected with the new piece, but Mr. Pogson considers that the space between the two will be useful, for a time at all events, as a place for landing timber, &c. It should, however, be closed without hesitation if the sea shows any signs of cutting in behind the present revetment.

8. The undersigned does not think that there is any danger to the portion of the shore covered by the existing revetment, but for some time to come the latter will be liable to settlement, and its maintenance must be accepted as a constant source of expenditure. It will require frequent feeding for some years to come.

9. The undersigned does not consider that there is any necessity for substituting a screen of wavebreaker blocks for the rubble revetments, as apparently contemplated by Sir Alexander Rendel in his report of the 28th November 1890. The latter appears to be quite efficient as far as it goes, and the former like the latter must end somewhere. The concrete blocks could have no such superiority as to justify their enormous expense.

10. The undersigned is altogether without belief in the value of groynes as a protection in such circumstances as the present, and believes the course hitherto followed of providing protection parallel to the line of coast to be the right one.

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

MADRAS,
3rd February 1891.

ORDER—dated 16th February 1891, No. 426 W., Public Works.

Communicated to the Chairman, Madras Harbour Trust Board, and to the Marine Department, in continuation of G.O., No. 2508 W., of 19th September 1890.

(True Extract.)

Major, R.E.,
Under-Secy. to Govt., P.W.D.

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

Exd. J. Henricus.
Spare Copies

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1891} Madras.
PUBLIC WORKS.

Dated February, 16th.

Recd. *Encl.*

G.O., 16th Feb. 1891, No. 426 W.

FEBRUARY.

Madras Harbour

Reports on the subject of restoring the — and the protection of the shore north of the harbour, communicated to the Chairman, Madras Harbour Trust Board.

426/4

19TH SEPTEMBER 1890, No. $\frac{13}{2508\ W.}$, PUBLIC WORKS.

PUBLIC WORKS DEPARTMENT.

LETTER—to

THE RIGHT HONORABLE THE SECRETARY OF STATE FOR INDIA.

MY LORD,

In continuation of our despatch No. $\frac{8}{1525\ W.}$, dated 30th May 1890, we have the honor to forward a copy of our Proceedings, No. 2508 W., dated 19th September 1890, embodying a report of the progress of the Madras Harbour Works for the quarter ending 30th June 1890.

2. A plan showing the state of the works at the end of the quarter is also forwarded, and the usual comparative statement of expenditure will follow.

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

(Signed) CONNEMARA.
(„) C. G. ARBUTHNOT.
(„) J. H. GARSTIN.
(„) J. GROSE.

OOTACAMUND,
19th September 1890.

Exd. J. Moses.

GOVT. OF MADRAS.

PUBLIC WORKS DEPARTMENT.

(Copy.)

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

No. $\frac{13}{2508\text{ W.}}$, dated 19th Sept. 1890.

Forwarding report of the progress of the Madras Harbour Works for quarter ending 30th June 1890, and a plan showing the state of the works.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

READ—the following paper :—

From W. P. AUSTIN, Esq., C.S., Chairman, Harbour Trust Board, to the Chief Secretary to Government, Marine Department, dated Madras, 28th October 1890, No. 367.

I have the honor to submit herewith, for the information of Government, the Engineer's report upon the progress made on the Madras Harbour Works during the quarter ending 30th September 1890, together with a plan in duplicate.

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 24th day of October 1890.

* * * * *

8. Read letter No. 873, dated 21st October, from the Board's Engineer, forwarding a statement showing the progress made on the Madras Harbour Works during the quarter ending 30th September with a plan.

Resolved,—that this report, with the accompanying plan, be submitted to Government.

* * * * *

(True Extract.)

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

PROGRESS STATEMENT No. 9.

MADRAS HARBOUR WORKS.

Statement showing progress during quarter ending September 1890 as shown on accompanying lithographed plan No. 8.

*Note.—The figures in *block* type denote for comparison progress and quantity of work done in quarter ending September 1889.

No. of item.	Particulars and quantity of work, &c.	Sub-heads of work.	North Pier.					South Pier.					Pallávaram quarries outturn.	Concrete block-making.	Railway lines at works.	Railway lines at quarries.	Railway lines, Sand line.	Railway lines, Beach improvements.	Protective works.	Total expenditure during third quarter ending 30th Sept. 1890.
			Rubble base.	Superstructure.	Wavebreaker.	Concrete capping.	Base protection.	Rubble base.	Superstructure.	Wavebreaker.	Concrete capping.	Base protection.								
		Column	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	Rubble stone deposited from boats	Tons.	1,031 2,048	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
2	Do. do. from wagons	,,	1,100	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	5,224¼	..
3	Total quantity rubble stone received on works ..	,,	..	..	..	..	..	..	..	..	..	..	1,901 7,237½	..	..	..	..	..	..	..
4	Do. blasted chips do. ..	,,	..	..	..	..	..	..	..	..	..	..	12,530½ 12,805½	..	..	..	..	..	..	..
5	Do. large stones do. ..	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
6	Concrete blocks, set by divers	Number.	..	214 350	..	..	..	..	180 109	..	..	..	..	..	..	..	..	..	..	..
7	Do. deposited in wavebreaker	,,	..	..	269 84	..	..	..	..	108 36	..	..	..	157 374	..	..	..	..	..	..
8	Do. made for superstructure	,,	..	..	..	..	..	..	..	..	..	..	..	433 177	..	..	..	..	..	..
9	Do. do. wavebreaker	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
10	Wrought-iron cramp fixed in position	,,	..	..	..	..	153½	..	..	..	..	140	..	9,831½ 8,843	..	..	..	..	..	..
11	Total outturn of concrete	C. yds.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
12	Advance or progress of completed superstructure ..	Ry. ft.	..	130½ 218½	..	..	138	..	112½ 37½	..	..	126	..	..	..	..	..	..	..	..
13	Rubble base protected with concrete	,,	..	1,240	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
14	Metre gauge, 40 lb. per yard laid new ..	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
15	Do. do. relaid or renewed ..	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
16	Do. do. taken up	,,	..	492 2,601	..	..	..	..	909 236	..	..	..	..	..	660 5,386	..	..	1,380 366	..	..
17	Broad gauge, 50 lb. per yard laid new	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
18	Do. do. relaid or renewed ..	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
19	Do. do. taken up	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
20	Titan gauge, 75 lb. per yard laid new	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
21	Do. do. relaid or renewed ..	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
22	Do. do. taken up	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
23	....																			
24	Approximate expenditure under sub-heads of work ..	Rs.	1,674	15,618	399	..	1,501	..	14,772	1,213	..	1,508	32,229	100,939	..	..	7,473	..	..	1,77,326

			Tons	Cwts.	Qrs.	Lb.
11,093	casks of cement received on works during quarter ending September 1890 containing.		1,980	17	3	12
7,616¼	do. issued for do.	do. ,, ,, do. ..	1,360	2	2	15
21,632⅔	do. balance in store at end of	do. ,, ,, do. ..	3,862	19	2	15

Quantity due on indents.	Tons	Cwts.	Qrs.	Lb.
Dated 14th March 1890 ..	1,113	7	3	12

(Signed) A. L. POGSON,
Engineer, Harbour Trust Board.

Madras,
8th October 1890.

4490

428/7

Transferred to the Public Works Department.

(Signed) J. F. PRICE,
Chief Secretary.

31st October 1890.

Order—dated 19th November 1890, No. 3085 W., Public Works.

The report will be forwarded to the Secretary of State for India.

2. The usual statement comparing expenditure with the sanctioned estimate is awaited.

(True Extract.)

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

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

Exd. S. Pereira.
Spare Copies

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated November, 19th.

Recd. *Encl.*

G.O., 19th Nov. 1890, No. 3085 W.

NOVEMBER.

Madras Harbour Works

Progress report of the — for the quarter ending 30th September 1890, ordered to be forwarded to the Right Honorable the Secretary of State for India.

PROGRESS STATEMENT No. 6:

STATEMENT showing progr

NOTE.—The figures in *block* type denote for comparison progress and quantity of work done in ~~June 1890.~~ corresponding quarter of 1889

No. of item.	Particulars and quantity of work, &c.
1	Rubble stone deposited from boats ..
2	Do. do. from wagons ..
3	Total quantity rubble stone received on works
4	Do. blasted chips do.
5	Do. large stones do.
6	Concrete blocks, set by divers .. ..
7	Do. deposited in wavebreaker ..
8	Do. made for superstructure ..
9	Do. do. wavebreaker ..
10	Wrought-iron cramp fixed in position ..
11	Total outturn of concrete .. ..
12	Advance or progress of completed superstructure
13	Rubble base protected with concrete ..
14	Metre gauge, 40 lb. per yard laid new ..
15	Do. do. relaid or renewed
16	Do. do. taken up ..
17	Broad gauge, 50 lb. per yard laid new ..
18	Do. do. relaid or renewed
19	Do. do. taken up ..
20	Titan gauge, 75 lb. per yard laid new ..
21	Do. do. relaid or renewed
22	Do. do. taken up ..
23	....
24	Approximate expenditure under sub-heads of work

11,033 casks of cement received on work
7,466 do. issued for
18,156 do. balance in store

Column A.—Item No. 1.} Stone was deposited upon
Do. F.—Item No. 1.} superstructure.
Do. B.—Item No. 6.—It was necessary to stop block
crane has to serve both purp
Do. C.—Item No. 7.—The 305 feet of superstructure
Do. G.—Items Nos. 6 and 12.—6¾ lineal feet of the s
Do. J.—Items Nos. 11 and 13.—Excellent progress w
evenly with the superstructu
Do. L.—Items Nos. 8, 9 and 11.—Blockmaking conti
both piers. More than ha
Do. Q.—Item No. 2.—11,582½ tons of large stone was

MADRAS,
31st July 1890.

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of (1890) Madras.

PUBLIC WORKS.

Dated November, 19th.

Recd. Encl.

G.O., 19th Nov. 1890, No. 3085 W.

NOVEMBER.

Madras Harbour Works

Progress report of the — for the quarter ending 30th September 1890, ordered to be forwarded to the Right Honorable the Secretary of State for India.

19th September 1890, No. 2508 W., Public Works.

426/8

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

Read—the following paper :—

From G. McWATTERS, Esq., M.A., C.S., Chairman, Harbour Trust Board, to the Chief Secretary to Government, Marine Department, dated Madras, 20th August 1890, No. 3199.

I have the honor to submit herewith, for the information of Government, the statement of progress of the Madras Harbour Works during the quarter ending 30th June 1890, together with a lithographed plan.

2. The Trustees have inspected the revetment at Cassimode and have instructed their Engineer to proceed with the work pending revision of the estimate (which has been found insufficient). It is very desirable that the revetment should be completed before the north-east monsoon sets in.

3. In view of the serious character of the erosion and the apparent difficulty of devising effectual means to stop it, the Trustees would be glad if the Chief Engineer would take an early opportunity after his return to Madras of seeing the place for himself and advising what further should be done.

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 15th day of August 1890.

* * * *

7. Examined statement and plan reporting progress made upon the Madras Harbour Works during the quarter ending 30th June 1890.

Recorded; and resolved that the Chairman be invited to address Government regarding the protective revetment at Cassimode, and that, pending the sanction of Government, the Engineer be directed to proceed with the work.

* * * *

(True Extract.)

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

MADRAS HARBOUR WORKS.

s during quarter ending 30th June 1890 as shown on accompanying lithographed plan No. 5.

	North Pier.*					South Pier.												
Sub-heads of work.	Rubble base.	Superstructure.	Wavebreaker.	Concrete capping.	Base protection.	Rubble base.	Superstructure.	Wavebreaker.	Concrete capping.	Base protection.	Pallavaram quarries outturn.	Concrete block-making.	Railway lines at works.	Railway lines at quarries.	Railway lines. Sand line.	Railway lines. Beach improvements.	Protective works.	Total expenditure.
Column	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
Tons	3,886 2,175 253½	..	..	..	..	2,116¼ 2,800¾ 592	..	..	..	..	..	..	..	..	..	..	..	..
„	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11,692½	..
„	..	..	..	..	..	..	..	..	..	..	4,103 19,215	..	..	..	..	..	..	..
„	..	..	..	..	..	..	..	..	..	..	9,512¼ 9,890¾	..	..	..	..	..	..	..
„	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Number	..	26 5	..	..	..	..	4 5	..	..	..	..	..	..	..	..	..	..	..
„	..	..	266 431	..	..	..	..	164 80	..	..	..	..	..	..	..	..	..	..
„	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
„	..	..	..	..	..	..	..	..	..	..	..	295 348	..	..	..	..	..	..
„	..	..	..	..	..	..	..	..	..	..	..	267 177	..	..	..	..	..	..
„	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
„	..	49 49	..	..	..	..	56 14	..	..	..	..	..	..	..	..	..	..	..
C. yds.	..	..	..	67½ 80	..	..	..	..	128¾ 60	682½	..	9,590¼ 8,159½	..	..	..	..	..	..
Rg. ft.	..	..	..	..	..	..	6¼	..	..	..	..	..	..	..	..	..	..	..
„	..	..	..	..	..	..	..	..	..	396	..	..	..	..	..	..	..	..
„	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
„	..	1,540	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
„	..	1,664	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
„	..	..	..	..	..	..	569	..	..	..	..	..	..	..	66	669½ 190	..	..
„	..	602	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
„	..	887	..	..	..	..	620	..	..	..	..	..	..	..	..	..	..	..
„	..	456	..	..	..	..	72½	..	..	..	..	..	..	..	..	..	..	..
„	..	236	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
„	..	155	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
„	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Rs.	3,247	9,299	2,473	1,784	..	1,474	7,610	2,783	1,020	3,962	46,399	88,671	..	..	17,942	..	..	1,85,794

	TONS	CWTS.	QRS.	LB.	*Quantity due on indents.*	TONS	CWTS.	QRS.	LB.
s during quarter ending 30th June 1890 containing.	1,951	4	1	7	Dated 20th September 1889 ..	94	2	3	9
do. do. 30th „ „ do. ..	1,333	5	1	8	„ 7th March 1890 ..	3,000	0	0	0
t end of do. 30th .. „ do. ..	2,242	4	1	15					

the north and south pier bases during exceptionally fair weather in May making up the full section of the rubble bases well in advance of the

etting at the north pier early in April to allow the length of superstructure built last quarter to be protected with the wavebreaker screen as the one
ase, until the new All-round Titan Crane arrives, when more rapid progress can be made.
rath to 31st March was protected with a wavebreaker to a section of 28 feet and contained 431 blocks.* The full section finally will be 40 feet.
uth pier head was built during April after which date the cranes had to be withdrawn for the monsoon in May.
s made during the quarter at protecting the rubble base with concrete which has brought up all arrears, and will enable this work to advance in future
ce.

ued steadily during the quarter, the outturn being 523 blocks, a portion of which completes all blocks required for the 24 feet wall up to the pier heads of
lf of the special blocks required for the south pier head were also made, and the *North Pier Head* blocks were commenced.
deposited in extending and widening the revetment at Cassimode.

(Signed) A. L. POGSON,
Engineer, Harbour Trust Board.

426/9

Transferred to the Public Works Department.

Ootacamund,
26th August 1890.

(Signed) J. F. PRICE,
Chief Secretary.

Order—dated 19th September 1890, No. 2508 W., Public Works.

The report will be forwarded to the Secretary of State for India.

2. The usual statement comparing expenditure with the sanctioned estimate during the quarter is awaited.

3. With reference to para. 3 of the Chairman's letter, the Chief Engineer, who will be at Madras at the beginning of October, will take an early opportunity of inspecting the place in question and submit his views as to the best means of checking the erosion at Cassimode.

(Here enter No. $\frac{13}{2508\ W.}$, dated 19th September 1890.)

(True Extract.)

Major, R.E.,
Under-Secy. to Govt., P.W.D.

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

Exd. J. Moses.
Spare Copies

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated September, 19th.

Recd. Encl.

G.O., 19th Sept. 1890, No. 2508 W.

SEPTEMBER.

III

Madras Harbour Works

Orders on the progress report of the — for quarter ending 30th June 1890.

Memorandum

Cor 8/11

The undersigned has intentionally delayed expressing any opinion upon the subject of the erosion of the shore to the North of the Madras Harbour until after the close of the N. E. monsoon.

After full consideration of the matter he is of opinion that no better course can be adopted than to continue the present revetment to a further length of about eight hundred yards (northwards) and then stop all attempts at protection, accepting the fact that a certain amount of erosion must take place.

It appears certain that wherever the revetment

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated September, 19th.

Recd. Encl.

G.O., 19th Sept. 1890, No. 2508 W.

SEPTEMBER.

Madras Harbour Works

Orders on the progress report of the — for quarter ending 30th June 1890.

---

ends the existing action of the sea will form a bay of more or less extent, and that the only effect of extending the revetment northwards is to move to the north the position of this bay; that it can be prevented from forming somewhere, ~~at all events to the south~~ the undersigned does not believe, at all events by any measure short of extending the revetment to the Ennore bar.

The extension proposed is recommended because the present revetment just stops short of some valuable buildings which will probably be destroyed in a couple of years more if no further protection is provided. Eight hundred feet of the

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated September, 19th.

Recd. *Encl.*

G.O., 19th Sept. 1890, No. 2508 W.

SEPTEMBER.

Madras Harbour Works

Orders on the progress report of the —
for quarter ending 30th June 1890.

---

north the land is much less valuable, and it does not seem profitable that anything would be gained by any further extension — 4ab/123

What the ultimate extent of the erosion will be, or in other words what will be the ultimate area of land removed, the undersigned cannot pretend to say; that it will have a limit is certain, and that when this limit is reached the coast will begin to advance again, and a portion of the land eroded be recovered, is by no means improbable —

The undersigned agrees with Mr Payne in considering that the extension of the revetment should not be in line with that already completed, but

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated September, 19th.

Recd. Encl.

G.O., 19th Sept. 1890, No. 2508 W.

SEPTEMBER.

Madras Harbour Works

Orders on the progress report of the — for quarter ending 30th June 1890.

4

connected to the sea (East) of it. Probably about the line of the present high water mark would be the best position; there is 6 no particular object in putting it too far to the west, as the ground gained would not be worth much, and the higher it is the easier it will be to construct and maintain. 4 28/13

The end of the present revetment should be finished off with a good mass of stone; ultimately it will probably have to be connected with the new pier, but Mr Pogson considers that the space between the two will be useful for time at all events, as a place for landing timber &c. It should however be closed without

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1890} Madras.

PUBLIC WORKS.

Dated September, 19th.

Recd. *Encl.*

G.O., 19th Sept. 1890, No. 2508 W.

SEPTEMBER.

Madras Harbour Works

Orders on the progress report of the —
for quarter ending 30th June 1890.

5

maintenance of the sea slopes in spite of cutting in behind the present revetment –

The undersigned does not think that there is any danger to the portion of the line covered by the existing revetment, but for some time to come the latter will be liable to settlement, and its maintenance must be accepted as a constant source of expenditure – It will require frequent feeding for some years to come –

426/14

The undersigned does not consider that there is any necessity for substituting a series of new timber works for the rubble revetment, as apparently contemplated by Sir A. Rendel in his report of the 28th November 1890 – The latter appears to be quite

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1890} Madras.
PUBLIC WORKS.

Dated September, 19th.

Recd. Encl.

G.O., 19th Sept. 1890, No. 2508 W.

SEPTEMBER.

Madras Harbour Works

Orders on the progress report of the —
for quarter ending 30th June 1890.

---

experimentation far as it goes, and the same like the latter must end some=where. The current Works could have no such experiments as to justify their enormous expense—

The undersigned is altogether without belief in the value of ~~figures~~ progress as a protection in such ~~extra~~ circumstances as the present, and believes the course hitherto followed, of providing protection parallel to the line of coast to be the right one—

426/15

E.W
30.1

Comd to Marine Dept in continuation of ~~with reference~~ to G.O. No 2508 W of 19.9.90—

Set of Plates with ref. 2 copies of 31.12.90 No 2—

1891

426/16

India Office,
London, 31st December 1890.

Public Works,
No. 2.

To His Excellency The Right Honourable The Governor in Council, Fort St. George.

Madras Harbour Works.

My Lord,

In continuation of previous correspondence relative to the work of restoring the Madras Harbour, I now forward, for your Excellency's information, copy of a report* on the subject which has been drawn up by Sir Alexander Rendel.

2. Most of the recommendations made in this report were contained in the minute read by Sir Alexander Rendel before the Harbour Trust Board during his visit to Madras in February last, and have already received the notice of your Government.

3. In the latter portion of the report the erosion of the shore north of the works is referred to as the gravest matter relating to the Harbour at present; and I notice, from your Public Works Letter, No. 13, dated 19th September 1890, that a reference has been made by the Trust Board to your Government on the subject. I shall be glad to be furnished with a report on the result of this reference, as well as with the views of your Government on Sir Alexander Rendel's recommendations generally.

I have the honour to be,
My Lord,
Your Lordship's most obedient humble Servant,
(Signed) Cross.

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* Dated 28th November 1890.

16

20475. I. 2691. A

ENCLOSURE.

Report by Sir Alexander Rendel.

A few days after my arrival in Calcutta in February last, some papers relating to Madras Harbour were forwarded to me by the Government of India, together with a telegram from the Secretary of State requesting the Government to consult me upon them.

The papers comprised observations by the Harbour Board, generally unfavourable, on my Report to the India Office on the Harbour dated 16th April 1889, and Despatches from the Government of Madras and the Government of India accepting the views of the Harbour Board.

It so happened that there appeared to be just then a pause in my share of the actual business which took General Strachey and myself to India, sufficient to allow of my visiting Madras, and I availed myself of the opportunity, arriving in Madras on the 23rd February. I stayed there three days, and having carefully examined the works of the Harbour and discussed the situation of its affairs with its Engineer, Mr. Lee Pogson, I drew up a note upon the conclusions I had arrived at, which I read to the Trustees at a meeting summoned for the purpose. I have appended a copy of the note to this Report, and it will be also found attached to the Despatch of the Government of India dated 23rd June last.

The recommendations I made in this note were generally the same as those which I had made in the Report before mentioned, with the exception that I did not raise the question of the entrance. On this subject I was silent, because I found that the Trustees held a very strong opinion that an eastern entrance was a mistake, that it would have to be replaced by an entrance at the north-eastern angle of the Harbour, and that they were entirely opposed to the view which I had expressed in my Report, that the proper remedy for such troubles as attached to an eastern entrance was the construction of inner works converting the Harbour into an inner and an outer harbour.

It was evidently as useless as it was fortunately unnecessary then to discuss this question. It had been decided to form the eastern entrance, and to defer further discussion upon its merits or demerits until experience of it had been obtained, and this was a course with which I could not but concur, because the eastern entrance, being a part of my scheme, its completion was at least as great an advance towards the adoption of my views as of those of the Trustees.

I therefore confined myself to details connected with the construction of the breakwaters on the present plan, and I am glad to say that here the Trustees accepted my views. They agreed to the entrance being made 500 feet wide instead of 450 feet, to which it had been previously intended to reduce it from the 550 feet originally proposed. They assented to the heads, together with the outer ends of the breakwater walls being founded at greater depths than had been intended, and to the southern head being formed of a mass of concrete in an iron caisson. They also assented to the wave-breaker blocks being thrown in on a propile measuring 40 feet wide at the top, where it had been previously proposed that the width should be only 28 feet, and they agreed to the paving of the rubble substructure on which the walls of the breakwaters stand being paved inside the Harbour with concrete *in situ*; and, as my advice appears to have been acted on, the Government of Madras has approved the proceedings of the Trust.

So constructed, I think the works will be secure from such cyclone waves as, from all I can learn, have to be encountered at Madras; and if, in addition, the walls of the breakwaters be raised when the rest of the works are complete, say six feet higher than at present, I believe that waves will be so far kept out of the Harbour as to make it a safe anchorage under all ordinary circumstances.

I should add, that I advised the Trustees to purchase a new titan crane and a steam launch for the use of the engineer. The former is necessary for the convenient deposit of the outer wave-breaker blocks, and will be useful afterwards as a crane for the unloading of heavy weights. The latter is necessary to allow of the engineer taking current soundings and other observations. All he has at present is an open row boat, which is quite ineffective for the purpose. Both crane and launch are now in course of being built.

I look forward, therefore, to the Harbour being completed on the design now sanctioned for a sum not greatly beyond the present sanction, because I understand that the sanctioned estimates include the widening of the wave-breaker block work to 40 feet.

But the expenditure upon it will not, in my opinion, end with the completion of the present scheme. A mere harbour of refuge is not wanted at Madras. What, it seems to me, is wanted there is a good commercial harbour, and a commercial harbour in which vessels discharge goods into or load up goods from boats which themselves load and discharge on a foreshore of sand is not worth the name,—at any rate, is not worth the sum which will have been spent on Madras Harbour by the time it is finished on even its present plan.

The Harbour Trust seems to consider that there is at present no demand at Madras for anything better; and as long as it is of this opinion, and until, in fact, the questions relating to the entrance are settled, it appears useless to discuss the subject. I will only say now upon it that I have so far seen nothing to change the views I expressed in my report before referred to.

As is well known, the shore line outside the Harbour has advanced considerably on its south side, and receded as considerably on its north side.

I do not think the advance on the south side threatens to diminish the depth at the entrance of the Harbour. It results more from the steepening of the slopes of the shore than from their growth seawards. Nor do I think that there is danger of the Harbour itself silting up in a manner which cannot be easily coped with in the ordinary way; but the receding of the shore on the north side is a more difficult matter.

Already the shore for the distance of about a mile north of the Harbour has been eaten into so seriously that a large sum has had to be paid in compensation for the loss of land, and a considerable expenditure has been, and is still being, incurred in depositing stone along the shore in the hope of stopping further depredations, and I regret to see by the papers attached to the Despatch from the Government of Madras to the Secretary of State, dated 19th September last, that the mischief is not yet stopped, and that the Trustees are asking for further advice upon it. Madras has the disadvantage of having practically no tidal rise, so that there is but little slope to be paved, where paving is so useful, I mean between low and high water mark. All that can be done is to throw in hard material so that it may be dragged down by the sea at its pleasure. If this process be unsuccessful, as I feared it might be when I was on the spot, it may be necessary to deposit a line or lines of large blocks of concrete somewhat similar to the wave-breakers used outside the breakwaters along, and probably also at right angles to the shore, at of course a heavy expense. This matter is, in my opinion, the gravest relating to the Harbour at present. The opinion asked for by the Trustees in the papers on this subject to which I have referred will no doubt be shortly forthcoming, and will give us the views of the Chief

Engineer of the Madras Presidency upon it. I should add, that I think the plan sent home with the quarterly reports should show that part of the shore which the sea has attacked and the stone deposits and other works by which the action of the sea is being held in check.

I have, in conclusion, to state that this note has been delayed first, because, expecting that the printed proceedings of the Trust would have reached England at a much earlier date than they did, I had left my own copy of the note I had read to the Trustees with the Officers of the Government in Calcutta; and 2nd, because I have been expecting that revised estimates would be sent home providing for the works I had recommended. These estimates have not yet reached me. The works, I may mention, appear from the quarterly returns lately sent home to have made good progress since my visit, and I may be allowed to add that the present arrangements as to engineering seemed to me to be quite satisfactory.

A. M. Rendel.

28th November 1890.

No 2

Public Works

31st December 1890

Copy

Letter to Fort St George

No 2 + Enclosure

Cir 825/91

A 4266/16.2.91

W[illegible] Cir [illegible]

Received 28th Jany /91

120

P 4266/19

India Office,
London, 31st December 1890.

Public Works,
No. 2.

To His Excellency The Right Honourable The Governor in Council, Fort St. George.

Madras Harbour Works.

My Lord,

In continuation of previous correspondence relative to the work of restoring the Madras Harbour, I now forward, for your Excellency's information, copy of a report* on the subject which has been drawn up by Sir Alexander Rendel.

2. Most of the recommendations made in this report were contained in the minute read by Sir Alexander Rendel before the Harbour Trust Board during his visit to Madras in February last, and have already received the notice of your Government.

3. In the latter portion of the report the erosion of the shore north of the works is referred to as the gravest matter relating to the Harbour at present; and I notice, from your Public Works Letter, No. 13, dated 19th September 1890, that a reference has been made by the Trust Board to your Government on the subject. I shall be glad to be furnished with a report on the result of this reference, as well as with the views of your Government on Sir Alexander Rendel's recommendations generally.

I have the honour to be,
My Lord,
Your Lordship's most obedient humble Servant,

Cross

---

* Dated 28th November 1890.

20475. 1. 2691. A

426/20

ENCLOSURE.

Report by Sir Alexander Rendel.

A few days after my arrival in Calcutta in February last, some papers relating to Madras Harbour were forwarded to me by the Government of India, together with a telegram from the Secretary of State requesting the Government to consult me upon them.

The papers comprised observations by the Harbour Board, generally unfavourable, on my Report to the India Office on the Harbour dated 16th April 1889, and Despatches from the Government of Madras and the Government of India accepting the views of the Harbour Board.

It so happened that there appeared to be just then a pause in my share of the actual business which took General Strachey and myself to India, sufficient to allow of my visiting Madras, and I availed myself of the opportunity, arriving in Madras on the 23rd February. I stayed there three days, and having carefully examined the works of the Harbour and discussed the situation of its affairs with its Engineer, Mr. Lee Pogson, I drew up a note upon the conclusions I had arrived at, which I read to the Trustees at a meeting summoned for the purpose. I have appended a copy of the note to this Report, and it will be also found attached to the Despatch of the Government of India dated 23rd June last.

The recommendations I made in this note were generally the same as those which I had made in the Report before mentioned, with the exception that I did not raise the question of the entrance. On this subject I was silent, because I found that the Trustees held a very strong opinion that an eastern entrance was a mistake, that it would have to be replaced by an entrance at the north-eastern angle of the Harbour, and that they were entirely opposed to the view which I had expressed in my Report, that the proper remedy for such troubles as attached to an eastern entrance was the construction of inner works converting the Harbour into an inner and an outer harbour.

It was evidently as useless as it was fortunately unnecessary then to discuss this question. It had been decided to form the eastern entrance, and to defer further discussion upon its merits or demerits until experience of it had been obtained, and this was a course with which I could not but concur, because the eastern entrance, being a part of my scheme, its completion was at least as great an advance towards the adoption of my views as of those of the Trustees.

I therefore confined myself to details connected with the construction of the breakwaters on the present plan, and I am glad to say that here the Trustees accepted my views. They agreed to the entrance being made 500 feet wide instead of 450 feet, to which it had been previously intended to reduce it from the 550 feet originally proposed. They assented to the heads, together with the outer ends of the breakwater walls being founded at greater depths than had been intended, and to the southern head being formed of a mass of concrete in an iron caisson. They also assented to the wave-breaker blocks being thrown in on a propile measuring 40 feet wide at the top, where it had been previously proposed that the width should be only 28 feet, and they agreed to the paving of the rubble substructure on which the walls of the breakwaters stand being paved inside the Harbour with concrete *in situ*; and, as my advice appears to have been acted on, the Government of Madras has approved the proceedings of the Trust.

3

So constructed, I think the works will be secure from such cyclone waves as, from all I can learn, have to be encountered at Madras; and if, in addition, the walls of the breakwaters be raised when the rest of the works are complete, say six feet higher than at present, I believe that waves will be so far kept out of the Harbour as to make it a safe anchorage under all ordinary circumstances.

I should add, that I advised the Trustees to purchase a new titan crane and a steam launch for the use of the engineer. The former is necessary for the convenient deposit of the outer wave-breaker blocks, and will be useful afterwards as a crane for the unloading of heavy weights. The latter is necessary to allow of the engineer taking current soundings and other observations. All he has at present is an open row boat, which is quite ineffective for the purpose. Both crane and launch are now in course of being built.

c

I look forward, therefore, to the Harbour being completed on the design now sanctioned for a sum not greatly beyond the present sanction, because I understand that the sanctioned estimates include the widening of the wave-breaker block work to 40 feet.

But the expenditure upon it will not, in my opinion, end with the completion of the present scheme. A mere harbour of refuge is not wanted at Madras. What, it seems to me, is wanted there is a good commercial harbour, and a commercial harbour in which vessels discharge goods into or load up goods from boats which themselves load and discharge on a foreshore of sand is not worth the name,—at any rate, is not worth the sum which will have been spent on Madras Harbour by the time it is finished on even its present plan.

The Harbour Trust seems to consider that there is at present no demand at Madras for anything better; and as long as it is of this opinion, and until, in fact, the questions relating to the entrance are settled, it appears useless to discuss the subject. I will only say now upon it that I have so far seen nothing to change the views I expressed in my report before referred to.

As is well known, the shore line outside the Harbour has advanced considerably on its south side, and receded as considerably on its north side.

I do not think the advance on the south side threatens to diminish the depth at the entrance of the Harbour. It results more from the steepening of the slopes of the shore than from their growth seawards. Nor do I think that there is danger of the Harbour itself silting up in a manner which cannot be easily coped with in the ordinary way; but the receding of the shore on the north side is a more difficult matter.

d

Already the shore for the distance of about a mile north of the Harbour has been eaten into so seriously that a large sum has had to be paid in compensation for the loss of land, and a considerable expenditure has been, and is still being, incurred in depositing stone along the shore in the hope of stopping further depredations, and I regret to see by the papers attached to the Despatch from the Government of Madras to the Secretary of State, dated 19th September last, that the mischief is not yet stopped, and that the Trustees are asking for further advice upon it. Madras has the disadvantage of having practically no tidal rise, so that there is but little slope to be paved, where paving is so useful, I mean between low and high water mark. All that can be done is to throw in hard material so that it may be dragged down by the sea at its pleasure. If this process be unsuccessful, as I feared it might be when I was on the spot, it may be necessary to deposit a line or lines of large blocks of concrete somewhat similar to the wave-breakers used outside the breakwaters along, and probably also at right angles to the shore, at of course a heavy expense. This matter is, in my opinion, the gravest relating to the Harbour at present. The opinion asked for by the Trustees in the papers on this subject to which I have referred will no doubt be shortly forthcoming, and will give us the views of the Chief Engineer of the Madras Presidency upon it. I should add, that I think the plan sent home with the quarterly reports should show that part of the shore which the sea has attacked and the stone deposits and other works by which the action of the sea is being held in check.

3.88
420/21

I have, in conclusion, to state that this note has been delayed first, because, expecting that the printed proceedings of the Trust would have reached England at a much earlier date than they did, I had left my own copy of the note I had read to the Trustees with the Officers of the Government in Calcutta; and 2nd, because I have been expecting that revised estimates would be sent home providing for the works I had recommended. These estimates have not yet reached me. The works, I may mention, appear from the quarterly returns lately sent home to have made good progress since my visit, and I may be allowed to add that the present arrangements as to engineering seemed to me to be quite satisfactory.

A. M. Rendel.

28th November 1890.

No 6

P. W. C. No 825

(54)

26.5.90. 1460 W
19.9.90. 13/2508 W
19.11.90. 3085 W

Public Works

31st December 1890

The Letter to Fort St George
No 2 & Enclosures

Rd 22/1/91

I

Received 21st Jany /91

P. W. D.

Memo.

426/221

The undersigned has intentionally delayed expressing any opinion on the subject of the erosion of the shore to the north of the Madras Harbour until after the close of the North East monsoon.

2. After full consideration of the matter he is of opinion that no better course can be adopted than to continue the present revetment to a further length of about eight hundred yards (northwards) and then stop all attempts at protection, accepting the fact that a certain amount of erosion must take place.

3. It appears certain that whenever the revetment ends the eroding action of the sea will form a bay of more or less extent, and that the only effect of extending the revetment northwards is to move to the north the position of this bay. That it can be prevented from forming, somewhere the undersigned does not believe, at all events by any measure short of extending the revetment to the Ennore bar.

4 The extension proposed is recommended because the present revetment just stops short of some valuable buildings which will probably be destroyed in a couple of years more if no further protection is provided. Eight hundred yards to the north the land is much less

valuable

valuable, and it does not seem probable that anything would be gained by any further extension.

426/23

5. What the ultimate extent of the erosion will be, or in other words what will be the ultimate area of land removed, the undersigned cannot pretend to say; that it will have a limit is certain, and that when this limit is reached the coast will begin to advance again, and a portion of the land ~~could~~ eroded be recovered, is by no means improbable.

6. The undersigned agrees with Mr. Napon in considering that the extension of the revetment should not be in line with that already completed, but somewhat to the rear (West) of it. Probably about the line

of

of the present high water mark would be the best position; there is no particular object in putting it too far to the East, as the ground gained would not be worth much, and the higher it is the easier it will be to construct and maintain.

7. The end of the present revetment should be finished off with a good mass of stone, ultimately it will probably have to be connected with the new pier, but Mr. Pagson considers that the space between the two will be useful for a time at all events, as a place for landing timber &c. It should, however, be closed without hesitation if the sea shows any signs of cutting in behind the present revetment.

8. The undersigned does not think that there is any

danger

danger to the position of the stone covered by the existing revetment, but for some time to come the latter will be liable to settlement, and its maintenance must

429/28

be accepted as a constant source of expenditure. It will require frequent feeding for some years to come.

9. The undersigned does not consider that there is any necessity for substituting a screen of wave breaker blocks for the rubble revetments, as apparently contemplated by Sir Alexander Rendel in his report of the 28th November 1890. The latter appears to be quite efficient as far as it goes, and the former like the latter must end somewhere. The concrete blocks could have no such superiority as to justify

their

their enormous expense.

10. The undersigned is alto-gether without belief in the value of groynes as a protection in such circumstances as the present; and believes the course hitherto followed, of providing protection parallel to the line of Coast to be the right one.

~~Col~~
Col R.E.
Chief Engineer P.W.D

Madras }
3rd Feby '91 }

No 426 W of 16th February

P R
Rest works

PUBLIC WORKS DEPARTMENT.

PROCEEDINGS OF THE MADRAS GOVERNMENT.

426/25

READ the following

Despatch from the Secy: of State for India. H.C. No. 2 d/ 31st December 1890

Memo by the Chief Engr: P.W.D. H.C. No. – d/ 3rd Feby: 1891

No 470 Communicated to the Chairman Madras Harbour Trust Board and to the Marine Department in continuation of G.O. No. 2508 W of 19th September 1890.

7 P

Intimated on the circular
B.S. McT

3.2

To
The Chairman M. H. T. Bd.
" Marine Dept

d 19/2/91

P.W.D.

X/

8 P

To the Rt. Hon. the Secy of State for India

My Lord, 42/3
26

With reference to Your Lordship's despatch No 2 Public Works dated 31st December 1890, we have the honour to forward a copy of our Pros. No 426 W of 16th ~~[illegible]~~ 1891, embodying a report by our Chief Engr. on the erosion of the shore to the north of the Madras Harbour Works, and to state that we concur in the views therein expressed, ~~both~~ with respect to the protective measures to be adopted ~~recommended~~, ~~and to the remarks on Sir Alexander Rendel's suggestions~~

Nos
476

We have &c

Desptd
19/4/91

~~[illegible]~~

~~[illegible]~~

Print [illegible]

II

Acc. 3.12.91

R.10/-

426/27

9

825

Govt. of Madras.

PUBLIC WORKS.

Immediate

10/3/98

Dated

Recd

(27)

G.O., [illegible] No. [illegible]

4

Madras Harbour

Reports on the subject of restoring the — & the protection of the shore north of the Harbour Commd to the Chairman M. H. T. Board.

6/3

Forwg: report by the Chief Engr PWD on the erosion of the shore north of the M H works.

7.