(1) பக்கங்களின் எண்ணிக்கை 44

(2) புதுக்கித் திருப்பிய நாள் 26 Feb 1990

(3) ஆதாரங்குறிப்பவர் சுருக்கொப்பம்

தமிழ்நாடு ஆவணக் காப்பகம்.

தமிழ்நாடு அரசு

P.W.D. துறை

அரசாணை எண். 720 அச்சகம்

மு. கோப்புத் தாள் எண். பலவகை

நாள் : 13. 3. 1891 198 .

மடிக்கவோ கண்டபடி கையாளவோ கூடாது

22 sheets.

ஆணை: கா-1—18,000—15-6-87.

720
1

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

READ—the following papers:—

From W. P. AUSTIN, Esq., C.S., Chairman, Harbour Trust Board, to the Chief Secretary to Government, dated Madras, 26th February 1891, No. 1954.

In continuation of my letter No. 1691, dated 16th instant, I have now the honor to submit, for information of Government and for the approval of the Right Honorable His Excellency the Governor in Council, under section 64, Act II of 1886, an estimate for extending the rubble revetment protecting the foreshore north of the harbour and I enclose the plan referred to.

2. The Trustees are of opinion that sanction should be accorded to the extension of the protection to the point C.

3. To stop short at B would ensure the destruction of the experimental village lately constructed for the accommodation of the boatmen, and it is necessary in the interests of the work of the port that these men should be located as near as possible to the harbour; they have already been forced to an inconvenient distance by the erosion of the sea.

4. It will be within the recollection of Government that a considerable outlay was sanctioned as a legitimate charge against Port funds to provide accommodation for boatmen. This has been effected by the Board's Secretary to a limited extent in the area which would be protected by the extension of the revetment to C without incurring the expenditure of a single rupee from Port funds by the simple expedient approved by the Trustees of permitting registered boatmen to build their own huts, merely compelling them to conform to regular line, thus giving ample space and ventilation, and I may remark that, although cholera and small-pox were epidemic around this model village in 1890, not a single death from either disease occurred within its limits. It would, therefore, seem a great pity to permit so valuable an adjunct of the port to be washed away and to do so would be a doubtful economy.

ENCLOSURE.

From A. LEE POGSON, Esq., Engineer, Harbour Trust Board, to the Chairman, Harbour Trust Board, dated Madras, 9th February 1891.

I have the honor to inform you that an inspection of the revetment and erosion to the north of the harbour was made by the Chief Engineer, Public Works Department, accompanied by Major Baddeley, R.E., and myself on the morning of the 28th January 1891.

2. After inspecting the plans and examining the position of the past and latest high water marks, it is evident that a further extension of revetment must be made, as shown on accompanying plan in red, to protect Cassimode from the possibility of further erosion this south-west monsoon.

3. The bay formed last year, as shown by the high water mark of 30th September 1890, has now nearly filled up, and the water line is approaching the high water mark of 28th February 1890, and will probably continue to do so until the middle of March when erosion again takes place.

4. The proposal to extend the revetment is made to prevent the roadway and property west of it being washed away should further erosion take place this year and increase the bay formed in September 1890, when the road was only 20 feet from the high water line

5. It will be impossible to secure *all* the sand secreted up to March on account of the time it will take to deposit the required amount of stone necessary to form the revetment shown in red upon the plan; therefore reckoning the work is commenced at the end of February the erosion will have returned to the high water mark of the 30th June 1890 in *four months*, which is the time the required stone will take to deposit, and, therefore, the position of the revetment must be fixed at the high water mark of the 30th June 1890.

6. Along this high water line I propose to raise a bank of stone (equal in quantity to the stone required to complete the revetment) from A to B on plan, which must be completed in 4 months when the erosion will reach and commence to undermine the bank of stone by the end of June and cause the rubble stone to fall forward and revet the eroding sand quicker than it would be possible to deposit the large amount of stone required at the receding waters-edge.

7. This mode of forming the revetment, if commenced at once (at the position shown), will give me time to collect and deposit the necessary stone before the erosion can have time to return to the June high water line.

8. A revetment so formed will show a great saving in cost per lineal foot of shore revetted, which will be Rs. 41-4-0 per lineal foot against Rs. 66 per lineal foot, as carried out last year, by tipping forward into deep water, which of course was the only alternative then, when the Deputy Traffic Manager's bungalow and land not belonging to the Trust had to be protected, and so far the extension then made at a cost of Rs. 32,274 has had the desired and anticipated effect.

9. The extension now necessary is to secure the accreted sand upon the Trust's property and to prevent the erosion reaching the roadway and further compensation upon private property.

10. To do this, it is necessary to extend the revetment along the line shown and the length of revetment from A to B will be 2,683 feet.

11. At B a bay equal to the high water line of 30th September 1890 will be formed and this will wash away the boatmen's village (*vide* my letter No. 1326, dated 7th February 1890); but no valuable property will be encroached upon and the estimated cost of the revetment will be as below.

12. If the Trustees wish to avoid again moving the boatmen's village further north, the revetment must be extended to C and this extra extension will cost Rs. 27,815.

Madras Harbour Works.—Estimate for extending rubble revetment from the present end opposite Mr. Hutchence's bungalow marked A on plan northwards to the point marked B with an alternative to the point marked C on plan.

N.B.—The point B is 2,683 feet from A.
" C is 637 " B.

Item.	Quantity.	Description of work.	Rate.	Per	Amount.
			RS. A. P.		RS. A. P.
1	4,200 tons.	Rubble in making up old revetment at masula boat bay and head at end marked D on plan	2 1 0	Ton	8,662 8 0
2	..	Laying down line from existing siding to south end of proposed revetment point A	..	..	..
3	680 l. feet.	Narrow gauge siding with 40 lb. rails	2 6 8	L. foot	1,643 5 4
4	1 set	Points and crossings	140 0 0	Set	140 0 0
5	680 c.yds.	Sand embankment to connect new siding with old ..	0 1 0	C. yard	42 8 0
6	2,683 l. ft.	Rubble stone revetment at 20 tons per lineal foot and Rs. 2-1-0 per ton, or	41 4 0	L. foot	1,10,673 12 0
	2,683 "	Narrow gauge siding, 40 lb. rails	2 6 8	..	6,483 14 8
		Total for from point A to point B ..	..	..	1,27,646 0 0
7	637 l. ft.	Rubble stone revetment at 20 tons per lineal foot and Rs. 2-1-0 per ton, or	41 4 0	L. foot	26,276 4 0
8	637 "	Narrow gauge siding, 40 lb. rails	2 6 8	..	1,539 6 8
		Total for from point A to C point ..	..	..	1,55,461 10 8

13. Early orders should be issued to enable me to secure and lay down at once the necessary railway materials to extend the revetment from A to B, the cost of which under items 2, 3, 4 and 6 of the above estimate amounts to Rs. 8,309-12-0.

14. Sanction should also be given to the outlay under item 1 (Rs. 8,662-8-0) to enable me to reform at once the mound at the end of the extension made to the revetment last year marked D on plan, which work is necessary and must be completed early in March.

720/2

Transferred to the Public Works Department.

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

2nd March 1891.

Note by the Chief Engineer, Public Works Department.

The general arrangements for extending the protective revetment and for which work estimates are now submitted by the Engineer, Harbour Trust Board, Madras, being in accordance with the views expressed by the undersigned in his memorandum embodied with G.O., No. 426 W., dated 16th February 1891, are approved.

2. The proposal to fix the position of the revetment at the line of high water mark of the 30th June 1890 is accepted.

3. The undersigned concurs with the opinion expressed by the Trustees of the Harbour Trust Board that it is advisable that the revetment should not stop short at B (on plan), but that it should be extended as far as C and thus obviate the necessity of again having to move the boatmen's village.

4. The undersigned observes that it is proposed that the stone required to complete the revetment should, in the first place, be raised in a bank, the actual formation of the revetment being performed by the action of erosion. To this method he raises no objection, but he would like to see the section which it is proposed to give to the bank of stones.

5. With these remarks the undersigned recommends that sanction be given to the estimate, amounting to Rs. 1,55,461-10-8.

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

March 1891.

ORDER—dated 13th March 1891, No. 720 W., Public Works.

The estimate, amounting to Rs. 1,55,462, for extending the rubble revetment protecting the foreshore north of the Harbour works, is sanctioned as proposed.

2. Attention is called to the remarks of the Chief Engineer, Public Works Department, recorded above.

(True Extract.)

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

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

Exd. A. D. Xavier.
Spare Copies

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1891} Madras.

PUBLIC WORKS.

Dated March, 13th

Recd.

Encl.

G.O., 13th Mar. 1891, No. 720 W.

MARCH.

Foreshore north of the Madras Harbour Works

Estimate of Rs. 1,55,462 for extending the rubble revetment protecting the —, sanctioned.

PROGRESS STATEMENT No. 6.

MADRAS HARBOUR WORKS.

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

No. of item.	Particulars and quantity of work, &c.	Column	North Pier. Sub-heads of work.	A	North Pier. Rubble base.	B	North Pier. Superstructure.	C	North Pier. Wavebreaker.	D	North Pier. Concrete capping.	E	North Pier. Base protection.	South Pier. Rubble base.	F	South Pier. Superstructure.	G	South Pier. Wavebreaker.	H	South Pier. Concrete capping.	I	South Pier. Base protection.	J	Pallavaram quarries outturn.	K	Concrete block-making.	L	Railway lines at works.	M	Railway lines at quarries.	N	Railway Lines, Sand line.	O	Railway lines, Beach improvements.	P	Protective works.	Q	Total expenditure.	R
1	Rubble stone deposited from boats	..	Tons.	3,986½ / 2,175½	..	..	..	..	..	2,116½ / 2,800½ / 592	..	..	..	..	4,103 / 19,215	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	11,582½	..
2	Do. do. from wagons	..	,,	253½	..	..	..	..	..	..	..	..	..	..	9,512½ / 9,890½	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
3	Total quantity rubble stone received on works	..	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
4	Do. blasted chips do.	..	,,	..	..	..	..	..	..	..	..	..	..	..	4 / 8	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
5	Do. large stones do.	..	Number.	..	26 / 4	..	..	..	..	..	..	..	..	..	164 / 80	..	..	..	..	..	..	..	..	..	295 / 346	..	..	..	..	..	..	..	..	..	..	..	..
6	Concrete blocks, set by divers	..	,,	..	..	..	266 / 431	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	267 / 177	..	..	..	..	..	..	..	..	..	..	..	..
7	Do. deposited in wavebreaker	..	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
8	Do. made for superstructure	..	,,	..	..	..	..	..	..	..	..	..	..	..	54 / 14	..	..	..	126½ / 50	..	682½	..	..	..	9,590½ / 8,159½	..	..	..	..	..	..	..	..	..	..	..	..
9	Do. do. wavebreaker	..	,,	..	49 / 49	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
10	Wrought-iron cramp fixed in position	..	C. yds.	..	..	..	..	..	67½ / 80	..	..	..	..	..	6½	..	..	..	..	..	596	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
11	Total outturn of concrete	..	Rg. ft.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
12	Advance or progress of completed superstructure	..	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
13	Rubble base protected with concrete	..	,,	..	..	..	1,540	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
14	Metre gauge, 40 lb. per yard laid new	..	,,	..	..	..	1,664	..	..	..	..	..	..	..	569	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
15	Do. do. relaid or renewed	..	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
16	Do. do. taken up	..	,,	..	..	..	502	..	..	..	..	..	..	..	620	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
17	Broad gauge, 50 lb. per yard laid new	..	,,	..	..	..	837	..	..	..	..	..	..	..	72½	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
18	Do. do. relaid or renewed	..	,,	..	..	..	456	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
19	Do. do. taken up	..	,,	..	..	..	135	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
20	Titan Gauge, 76 lb. per yard laid new	..	,,	..	..	..	135	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
21	Do. do. relaid or renewed	..	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
22	Do. do. taken up	..	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
23	.....																																			
24	Approximate expenditure under sub-heads of work	..	Rs.	3,247	9,299	2,473	1,784	..	1,474	7,610	2,732	1,020	3,902	46,399	88,671	..	..	17,042	..	..	1,85,704																

11,033 casks of cement received on works during quarter ending 30th June 1890 containing. TONS CWTS. QRS. LB. *Quantity due on indents.* TONS CWTS. QRS. LB.
7,466 do. issued for do. do. 30th ,, ,, do. .. 1,951 4 1 7 Dated 26th September 1889 .. 94 2 3 9
13,156 do. balance in stock at end of do. do. 30th ,, ,, do. .. 1,333 5 1 8 ,, 7th March 1890 .. 3,000 0 0 0
3,242 4 1 18

Column A.—Item No. 1. Stone was deposited upon both 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
Do. F.—Item No. 1. superstructure.
Do. B.—Item No. 5.—It was necessary to stop blocksetting 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 crane has to serve both piers, until the new All-round Titan Crane arrives, when more rapid progress can be made.
Do. C.—Item No. 7.—The 305 feet of superstructure built 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.
Do. G.—Items Nos. 6 and 12.—6½ lineal feet of the south pier head was built during April after which date the cranes had to be withdrawn for the monsoon in May.
Do. J.—Items Nos. 11 and 13.—Excellent progress was 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 evenly with the superstructure.
Do. L.—Items Nos. 8, 9 and 11.—Blockmaking continued 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 both piers. More than half of the special blocks required for the south pier head were also made, and the *North Pier Head* blocks were commenced.
Do. Q.—Item No. 2.—1,582½ tons of large stone were deposited in extending and widening the revetment at Cassimode.

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

Madras,
31st July 1890.

720/3

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.

720/4

Transferred to the Public Works Department.

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

Ootacamund,
26th August 1890.

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.)

(Signed) J. PENNYCUICK, Colonel, R.E.,
Secretary 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. 2503 W.

SEPTEMBER.

Madras Harbour Works

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

720/5

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).

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.

Madras Harbour Works
* 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

720/6

Government in Calcutta; and second, 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.

28th November 1890. (Signed) A. M. RENDEL.

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.

MADRAS, (Signed) J. PENNYCUICK, Colonel, R.E.,
3rd February 1891. Chief Engineer, P.W.D.

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.)

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

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

Exd. A. D. Xavier.

729/1

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.

720/8

PUBLIC WORKS DEPARTMENT.

LETTER—to

THE RIGHT HONORABLE THE SECRETARY OF STATE FOR INDIA.

MY LORD,

With reference to Your Lordship's Despatch No. 2 (Public Works), dated 31st December 1890, we have the honor to forward a copy of our Proceedings, No. 426 W., dated 16th February 1891, embodying a report by our Chief Engineer 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 with respect to the protective measures to be adopted.

We have the honor to be,

My Lord,

Your Lordship's most obedient, humble servants,

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

FORT ST. GEORGE,
16th February 1891.

Exd. J. Henricus.

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GOVT. OF MADRAS.

PUBLIC WORKS DEPARTMENT.

(Copy.)

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

No. 4 / 426 W. dated 16th Feb. 1891.

Forwarding report by the Chief Engineer, Public Works Department, on the erosion of the shore north of the Madras Harbour Works.

720/10

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, dated Madras, 16th February 1891, No. 1691.

I have the honor to inform you that, at their meeting on Friday last, the Trustees of the Harbour had before them an estimate, submitted by their Engineer, amounting to Rs. 1,55,462, for protecting the foreshore to the north of the harbour, and it is understood that the Chief Engineer, Public Works Department, is of opinion that the work should be taken in hand at once to prevent the loss of the sand, which has accumulated during the past north-east monsoon and which, unless secured, will commence to erode on the change of the current during April next.

2. The estimate and Mr. Pogson's explanatory letter are being printed for the information and orders of Government and will be submitted at a very early date, but, as railway material is required for the extension of the line to carry rubble from the quarries, I am requested by the Trustees to apply for the permission of Government to the expenditure of about Rs. 18,000 for this purpose and to secure the end of the existing rubble revetment.

Approved and transferred to the Public Works Department.

FORT ST. GEORGE,
23rd February 1891.

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

ORDER—dated 27th February 1891, No. 554 W., Public Works.

The expenditure of Rs. 18,000 in the manner proposed is sanctioned in anticipation of orders on the estimate for protecting the foreshore to the north of the harbour.

(True Extract.)

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

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

Exd. A. D. Xavier.
Spare Copies

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1891} Madras.

PUBLIC WORKS.

Dated February, 27th.

Read.

Encl.

G.O., 27th Feb. 1891, No. 554 W.

FEBRUARY.

Madras Harbour

Proposed expenditure of Rs. 18,000 for protecting the foreshore to the north of the —, sanctioned.

720/11

From

THE ENGINEER,
HARBOUR TRUST BOARD,
MADRAS.

3 88

To

THE CHAIRMAN,
HARBOUR TRUST BOARD,
MADRAS.

Madras, 9th February 1891.

SIR,

I have the honor to inform you that an inspection of the revetment and erosion to the north of the Harbour was made by the Chief Engineer, P. W. D., accompanied by Major Baddeley, R.E., and myself on the morning of the 28th January 1891.

2. After inspecting the plans and examining the position of the past and latest High Water Marks, it is evident that a further extension of revetment must be made as shown on accompanying plan in red, to protect Cassimode from the possibility of further erosion this South-West Monsoon.

3. The bay formed last year as shown by the High Water Mark of 30th September 1890 has now nearly filled up, and the water line is approaching the High Water Mark of 28th February 1890; and will probably continue to do so until the middle of March when erosion again takes place.

4. The proposal to extend the revetment is made to prevent the roadway and property west of it being washed away should further erosion take place this year, and increase the bay formed in September 1890, when the road was only 20 feet from the High Water line.

5. It will be impossible to secure *all* the sand secreted up to March on account of the time it will take to deposit the required amount of stone necessary to form the revetment shown in red upon the plan; therefore reckoning the work is commenced at the end of February the erosion will have returned to the High Water Mark of the 30th June 1890 in *four months*, which is the time the required stone will take to deposit; and therefore the position of the revetment must be fixed at the High Water Mark of the 30th June 1890.

6. Along this High Water line, I propose to raise a bank of stone (equal in quantity to the stone required to complete the revetment) from A to B on plan; which must be completed in 4 months when the erosion will reach, and commence to undermine the bank of stone by the end of June, and cause the rubble stone to fall forward and revet the eroding sand quicker than it would be possible to deposit the large amount of stone required at the receding waters-edge.

7. This mode of forming the revetment if commenced at once (at the position shown) will give me time to collect and deposit the necessary stone before the erosion can have time to return to the June High Water line.

8. A revetment so formed will show a great saving in cost per lineal foot, of shore revetted, which will be Rupees **41-4-0** per lineal foot against Rupees 66 per lineal foot, as carried out last year, by tipping forward into deep water; which of course was the only alternative then, when the Deputy Traffic Manager's Bungalow and land not belonging to the Trust had to be protected; and so far the extension then made at a cost of Rupees **32,274** has had the desired and anticipated effect.

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12

9. The extension now necessary, is to secure the accreted sand upon the Trust's property and to prevent the erosion reaching the roadway, and further compensation upon private property.

10. To do this, it is necessary to extend the revetment along the line shown, and the length of revetment from A to B will be 2,683 feet.

11. At B a bay equal to the High Water line of 30th September 1890 will be formed, and this will wash away the Boatmen's Village, vide my letter No. 1326 dated 7th February 1890, but no valuable property will be encroached upon and the estimated cost of the revetment will be as below.

12. If the Trustees wish to avoid again moving the Boatmen's Village further north, the revetment must be extended to C, and this extra extension will cost Rs. **27,815.**

MADRAS HARBOUR WORKS.

Estimate for extending rubble revetment from the present end opposite Mr. Hutchence's bungalow marked A on plan northwards to the point marked B, with an alternative to the point marked C on plan.

N.B.—The point B is 2,683 feet from A.
" C is 637 " " B.

Item.	Quantity.	Description of Work.	Rate. Rs.	A.	P.	Per	Amount Rs.	A.	P.
1	4,200 tons.	Rubble in making up old revetment at Masula Boat bay and head at end marked D on plan..	2	1	0	Ton ...	8,662	8	0
2	680 l. ft...	Laying down line from existing siding to South end of proposed revetment point A	...	...	...	...	...	...	...
3	1 set ...	Narrow gauge siding with 40 lbs. rails	...	...	...	...	...	...	...
4	680 cyds...	Points and crossings...	2	6	8	l. ft....	1,643	5	4
5	2,683 l. ft...	Sand embankment to connect new siding with old.	140	0	0	Set ...	140	0	0
6	2,683 " ...	Rubble stone revetment at 20 tons per lin. ft. and Rs. 2-1 per ton or	0	1	0	Cyd....	42	8	0
		Narrow gauge siding 40 lbs. rails	41	4	0	l. ft. ...	1,10,673	12	0
			2	6	8	...	6,483	14	8
		Total for from point A to point B...					1,27,646	0	0
7	637 l. ft...	Rubble stone revetment at 20 tons per lin. ft. and Rs. 2-1 per ton or	41	4	0	l. ft. ...	26,276	4	0
8	637 " ...	Narrow gauge siding, 40 lbs. rails	2	6	8	...	1,539	6	8
		Total for from point A to C point...					1,55,461	10	8

13. Early orders should be issued to enable me to secure and lay down at once the necessary Railway materials to extend the revetment from A to B, the cost of which, under Items 2, 3, 4 and 6 of the above estimate, amounts to Rs. **8,309-12-0.**

14. Sanction should also be given to the outlay under Item 1 = Rs. **8,662-8-0** to enable me to reform at once the mound at the end of the extension made to the revetment last year marked D on plan, which work is necessary and must be completed early in March.

I have the honour to be,
Sir,
Your most obedient Servant,
A. LEE POGSON,
Engineer, Harbour Trust Board.

720/12

Inward No. 217

Harbour Trust Board Office.

MADRAS, 26th February 1891.

No. 1954

1P 720/13

From

Ware austin Esquire, C.S.,

Chairman, Harbour Trust Board,
MADRAS.

To

The Honorable J. F. Price, C.S.I.,

Chief Secretary to Government,
Marine Department.

Sir,

In continuation of my letter, No. 1691 dated 16th instant, I have now the honor to submit for information of Government and for the approval of the Right Honorable H.E. the Governor in council, under Section 64 act II of 1886, an estimate for extending the rubble revetment protecting the foreshore north of the Harbour, and I enclose the plan referred to.

2. The Trustees are of opinion that sanction should be accorded to the extension of the protection to the point C.

3. To stop short at B would ensure the

the destruction of the experimental village lately constructed for the accommodation of the boatmen, and it is necessary in the interests of the work of the port that these men should be located as near as possible to the Harbour; they have already been forced to an inconvenient distance by the erosion of the Sea.

4. It will be within the recollection of Government that a considerable outlay was sanctioned, as a legitimate charge against Port Funds, to provide accommodation for boatmen. This has been effected by the Board's Secretary to a limited extent in the area which would be protected by the extension of the revetment to C without incurring the expenditure of a single rupee from Port Funds by the simple expedient - approved by the Trustees - of permitting registered boatmen to build their own huts merely compelling them to conform to regular line thus giving ample space and ventilation; and I may remark that although Cholera and Small-pox were epidemic around this model village in 1890, not a single death from either disease occurred within its limits. It would therefore seem a great pity to permit so valuable an adjunct of the port to be washed away, and to do so would be a doubtful economy.

7929/14

I have the honor to be
Sir
Your obdt. Servant

Chairman
Harbour Trust Board

720/15

C.W. & P.W.C. No 2397

5P

5

D/ 2d March 91

Transferred to the Public Works Dept.

[illegible]
Chief Secretary

J.D.B.
27/2

B 3-3-91
E-2

(+1 plan)

16.2.91. 426W
16.2.91. 4/426W
27.2.91. 554 W

Cuv. 217

MARINE DEPARTMENT.

From

THE CHAIRMAN,
Harbour Trust Board,
MADRAS.

To

The Chief Secretary to Government,
Marine Department.

Dated 26 }
Received } February 1891.

Enclosure (2)

Chief Secretary No. 1962 25 FEB 91 Government

SUBJECT.

Submitting Estimate for extension of Stone revetment to protect the foreshore north of the Madras Harbour.

Transferred

Printed by G. W. Taylor, Lawrence Asylum Press, Madras—1890.

Sanction

Note.

2397

The General Arrangements for extending the protective ~~arrangement revetment and about it [illegible] the [illegible] ago~~, and for which works estimates are now submitted by the Engr. H.T. Bd. Madras, being in accordance with the views expressed by the undersigned in his Memo. embodied with G.O. No. 426W / 16-2-91 are approved –

The proposal to fix the position of the revetment at the line of H.W.M of the 30th June 1890 is accepted –

The C.S. concurs with the opinion expressed by the Trustees of the H. Bd. that it is advisable that the revetment should not stop short

C.W. of PWC No 2397

5 B

S

D/ 2d March 91

Transferred to the Public Works Dept.

[signature]
Chief Secretary

F.D.B.
27/2

B 3-3-91
E-7/2
(+1 plan)

16.2.91. 426W
16.2.91. 4/426W
27.2.91. 554W

at B (in plan) but that A should be extended as far as C, and thus obviate the necessity of again having to move the boatmen's village.

The C. S. observes that it is proposed that the stone required to complete the revetment should in the first place be raised in a bank, the actual formation of the revetment being performed by the action of erosion — To this method he raises no objection, but he would like to see the section on which it is proposed to ~~raise~~ give to the bank of stone.

With these remarks [illegible] recommends that sanction be given to the estimate amounting to Rs. 1,55,461-10-8

72/17

O.C.B.
6.3.91

C.W. & P.W.C. No 2397

5

5P

D/ 2d March 91

Transferred to the Public Works Dept.

[illegible]
Chief Secretary

DB.
7/[illegible]

[illegible] 3-3-91

E-7/2

(+1 plan

16.2.91. 426W
16.2.91. 4/426W
27.2.91. 554W

720/17

2397.

R.K.

Please add the G.O. – a day or two ago – authorising expenditure on this work in anticipation of sanction to the estimate

720/18

[illegible] 5

CAW

The G.O. (No 554 W of 27 Feby) is in press

[illegible] 5-3-91

C.W. [illegible] No 2397

5 P

D/ 2d March 91

Transferred to the Public Works Dept.

[illegible]
Chief Secretary

F.D.B.
27/[illegible]

[illegible] 3-3-91

[illegible]

(+1 plan)

16.2.91. 426W
16.2.91. 4/426W
27.2.91. 554W

720/17

Public Works Department.

Current No. 2397

Letter No. Nil

Dated 2nd March 1891

From the Marine Department

[illegible]

NOTE OF REMARKS. 720/19

The accompanying plans & estimate the latter amounting to Rs 15,431-11-8 provide for extending the Stone revetment to protect the fore-shore north of the [illegible] Harbour. Particulars are given in the [illegible] letter to the Chairman of the Board.

No sections of the proposed revetment or Specification are submitted.

The rates cannot be checked.

The plan & Estimate have been [illegible] by the Chairman Harbour Trust Board & transferred to this Deptt: by the Marine Deptt:

[illegible]
5.3.91 [illegible]

Note by the Chief Engineer
P.W.D. dt March 1891.

720/20

The general arrangements for extending the protective revetment and foreshore works estimated are now submitted by the Engineer Harbour Trust Board, Madras, being in accordance with the views expressed by the undersigned in his memo enclosed with G.O. No 426 dt/16th February 1891 are approved.

720/21

2. The proposal to fix the position of the revetment at the line of N. W. Ch. of the 30th June 1890 is accepted.

3. The undersigned concurs with the opinion expressed by the Trustees of the Harbour Trust Board that it is advisable that the revetment should not stop short at B (on plan) but that it should be extended as far as C, and thus obviate the necessity of again having to move the boatmen's village.

4. The undersigned observes that it is proposed that the

21 stone

stone required to complete the revetment should, in the first place, be raised in a bank, the actual formation of the revetment being performed by the action of the erosion. To this method he raises no objection, but he would like to see the section which it is proposed to give to the bank of stones.

5. With these remarks the undersigned recommends that sanction be given to the estimate amounting to Rs. 155461-10-8

Chief Engr P.W.D.

Col R.E.

PUBLIC WORKS DEPARTMENT

PROCEEDINGS OF THE MADRAS GOVERNMENT.

720/24

READ the following

Endorsement in the Marine Deptt. dy 2nd March 1891

Noted by the Chief Engr. P.W.D. dy March 1891

1P

The estimate amounting to Rs. 155,461 for extending the rubble revetment protecting the foreshore south of the Harbour works is sanctioned as proposed.

2. Attention is called to the remarks of the Chief Engineer P.W.D. recorded above.

720/24

Rs. 1,55,461

To The Chairman H.T.B. with plan. Marine Deptt.

P.W.D. 6.3.91

24

2873

R.P.

W.

2397.

Govt. of 18 Madras.

PUBLIC WORKS.

Urgent

13/3/9

Dated

Recd.

Encl.

(28)

G.O., 13 March 1891, No. 720 W.

Foreshore north of the M. H. works.

Estimate of Rs 1,55,462, for extending the rubble revetment protecting the — sanctioned.

60
/4

(28)

[illegible] 13/3

9/13/3