(1) பக்கங்களின் எண்ணிக்கை 46

(2) புதுக்கித் திருப்பிய நாள் ~~11.10.~~ 14.11.91

(3) ஆதாரங்குறிப்பவர் சுருக்கொப்பம்

தமிழ்நாடு ஆவணக் காப்பகம்.

தமிழ்நாடு அரசு

நிருவாகச் சீர்திருத்தத் துறை

அரசாணை எண். 1884 / 1885 — அச்சகம் பலவகை

மு. கோப்புத் தாள் எண்.

நாள் : 21. 7. 1893 1988.

மடிக்கவோ கண்டபடி கையாளவோ கூடாது

ஆவண. கா-1—18,000—15-6-87.

1884 — 55
1

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

Read—the following paper :—

From J. STURROCK, Esq., I.C.S., Chairman, Harbour Trust Board, Madras, to the Chief Secretary to Government, dated Madras, 24th June 1893, No. 929.

I have the honour to submit, for the information of Government and for transmission to the Right Honorable the Secretary of State, report upon the progress of the Madras Harbour Works for the quarter ending 31st March 1893.

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 9th day of June 1893.

* * * * *

8. Read letter from the Board's Engineer, No. 111, dated 18th May, submitting report upon the progress made with harbour construction during the quarter ending 31st March 1893.

Recorded and resolved that this report be submitted to Government.

* * * * *

(True Extract.)

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

Report of progress on the Madras Harbour Works for the quarter ending 31st March 1893.

Accompanying this report are the following plans and statement :—

No. 31 (*a*).—A plan of the harbour to a scale of 200 feet to an inch, showing in red the position and quantity of work done during the quarter. The contours in half fathoms shown on this plan are those of the last complete marine survey of 1889. The positions of the high water marks of the 31st March 1893 and that of the previous twelve months, both to the north of the revetment and the south of the harbour, are shown for comparison.

No. 31 (*b*).—A revised plan showing in detail the pier heads as now being constructed and the positions of the caissons for completing both piers of the harbour with an entrance of 520 feet.

No. 31 (*c*).—A statement comparing the expenditure on different sub-heads of work up to the end of the quarter with the provisions of the sanctioned estimate.

No. 31 (*d*).—A statement showing work done under different sub-heads and particulars of cement received and issued.

2. The various heads of work, &c., throughout the Harbour Works are reported in as follows.

3. *General.*—The quarter under review (January, February and March) is generally the most favorable one in the year for marine work, and, after deducting the Sundays and non-working days in the quarter, there remained 77 working days for sub-marine work should the weather have proved favorable; but as it happened, due to rough sea and other causes, there were only 63 days fit for work, and upon which progress was made at the north pier, and 57 days were available for work at the south pier; from the earliest date the crane could be got into position for block setting.

4. *North pier head.*—On the 9th January, fair weather had set in and the north pier titan crane was travelled out to commence work, with a steady run of 63 working days ahead before the crane need return to shore for the next monsoon. During the quarter fair weather favored the works and good progress was made.

5. Of the available 63 working days, 53 days were occupied in dredging the rubble base down to the required depth at which the pier head is founded and 11 days were taken up in levelling the beds by divers and setting five courses or 120 large blocks, which progress made an advance, to the completed work of 26′ 10½″ to the north pier head, at the widest and deepest section of the work.

6. With this report is submitted a large scale plan (*b*), 20 feet to an inch, and upon it is shown more clearly: in red the progress made during the quarter at the pier heads, as the usual plan accompanying these reports is upon a very small scale and it is difficult to show what is being done when so little advance above water level can be recorded; but, upon a minute examination of this plan, it will be seen that nearly all work in the future, until the completion of the pier heads, is under water and more difficult than it has hitherto been, but nevertheless steady and good progress is being made.

7. Two average cross sections of both of the ruined old pier heads are shown—one as the work was before reconstruction and as the storm of 1881 left it, and the second shows the work or section as reconstructed, or may be nearing completion under the sanctioned design.

8. From these sections it will be seen what an amount of dredging into the consolidated rubble base is necessary to found the piers at a safe level below wave action and also the great amount of *débris* and old block work which has to be removed by *divers* to make room for the new bonded superstructure and the solid cylindrical mass of concrete which is to terminate each pier head. The most difficult part of the whole of the work lies in the successful setting in position of these caissons and their thorough foundation and union with the old work.

9. Beyond the progress made during the quarter shown in red upon plan (*b*) there still remains two more permanent courses to be set at the north pier, or 10½ feet of wall to be built, before the point is reached where the caisson is to be set, and of these two courses one has been set since the quarter closed.

10. After these two courses are set, which will be the last of the permanent work of the north pier, there will be still six courses of block work to be set [as shown on plan (*b*) in dotted lines] to enable the foundation or rubble base being prepared to receive the huge cylindrical mass of concrete to be made in the caissons; these courses, after having thoroughly compressed the base with their combined weights, are to be again raised and used as wavebreaker blocks and the base so compressed is to be the foundation upon which the caisson is to be lowered and when set rapidly filled with concrete at a time when a really smooth sea can be relied upon for at least ten days on end and this is only likely in the months of September or February.

11. Preparations are therefore being made in case progress should be rapid enough at the north pier to construct and set the north pier head caisson this September; otherwise the north pier head will not be completed till February next and then the north pier staff, cranes, and machinery will be available for any further work in constructing jetties, &c.

12. *South pier head.*—At the south pier there were 57 days during the quarter, upon which progress was possible under water, and of these days 23 were devoted to dredging down to the necessary depth at which the pier is founded and 26 days were occupied in raising, blasting, and removing pieces of the old overthrown blocks, &c., and 8 days went to setting 73 large special blocks which was the progress during the quarter of three completed courses as shown in red on plan (*b*) at the south pier head.

13. The advance of completed superstructure at this pier head was therefore 16′ 1½″ during the 57 working days.

14. This progress when considered with the fact that the base was dredged and so far ready at the end of the quarter, that another course or further advance was made to each pier head of 5′ 4½″ a few days later (not recorded in this report as the progress belongs to the following quarter), the work of the quarter under review must be considered excellent and rapid at these more difficult and wider portions of the work.

15. At this pier head there still remains 7 courses or 37½ feet of permanent work to be built before the temporary block work for the caisson is commenced upon as already explained under paragraph 10 of the north pier.

16. *North and south piers apron or protection to rubble base.*—At both piers, at intervals during the quarter, when dredging was not going on and the divers were not required at the pier heads, their labour was directed towards preparing the rubble base along both piers preparatory to receiving the concrete, forming the apron at the footing of the superstructure. A good length of the base was at the close of the quarter ready to receive the concrete as soon as the crane was available for the work.

17. *Foreshore north of the harbour.*—As reported in the quarterly report ending 31st December 1892, paragraphs 21 and 22, the revetment was found from the sections taken to be very much drawn down seawards; consequently on 11th January 1893 prompt measures were taken to make good the line of railway and to deposit stone where necessary to the extent of the balance of the sanctioned estimate.

18. Throughout the length of the new revetment A to C on plan 6,864¼ tons of large boulders were received from the Pallávaram quarries and deposited, forming as high a bank as possible tipped from the wagons. There only remains a small quantity of stone yet to be deposited to complete the already sanctioned estimate, but further teeding with large stone will be necessary before the close of the year; therefore sanction for a steady maintenance of this revetment should be accorded so that it can be made up where weak without any delay in referring for sanction. It is impossible to estimate the cost or quantity of stone required for upkeep of this work as it depends upon the action of the sea from time to time, but the main point is to have stone ready under sanction, to be deposited at few hours' notice to fill up each breach as it occurs, for the next year or so when this new line of revetment will settle down and consolidate as the old revetment has done.

19. The high water mark shown upon the plan indicates the usual advance of sea shore and accretion which takes place till about April, but the advance is getting less, thereby leaving the revetment exposed to the sea longer each year until finally it has to withstand the seas all the year round and until then the slope of the revetment is continually being washed down and must be made up from time to time until it stands at a natural slope as the old work has done.

20. *Foreshore south of and depth within the harbour.*—The depth within the harbour and at the entrance remains unaltered and due to the absence of any swell or surf inside the harbour; during the quarter the high water mark within the harbour has advanced slightly, due to the sand thrown up being able to stand at a greater slope; as soon as a rough sea or any wave motion again takes place inside the harbour this slope is flattened, which carries the high water mark further back for a time.

21. The accretion of sand to the south of the harbour does not make any or very little advance in this quarter, but what has been heaped up in the corner of the south arm of the harbour is carried south and the water line flattened as the high water mark of 31st March 1893.

22. *Miscellaneous—Work for the Harbour Trust Board, Traffic Department, &c.*—Eight new pier trucks were built and handed over to the Traffic Department capable of carrying loads up to 10 tons.

23. A timber watchman's shelter or look-out was built for Harbour Master's office and erected thereon; also the building was fenced in on both the east and west sides.

24. Forty-six notice boards of the Traffic Department rules were made, mounted and varnished and three latrines were re-erected on the beach and an old latrine on the iron pier was repaired.

25. Alterations were made to the Biden Home to accommodate the Third Harbour Master.

26. Several of the iron pier cranes were overhauled and repainted and all railway lines, &c., and in connection with the Traffic Department maintained in good working order.

The expenditure to the end of the quarter including establishment, tools and plant and contingencies is Rs. 1,19,38,529 out of a total estimated cost of Rs. 1,23,83,386, leaving a balance of Rs. 4,44,857 to be spent for completion.

1884-85 g

MEMORANDUM to accompany statement of progress for the quarter ending 31st March 1893.

		Rs.
1.	Estimated sum required to complete the work at the commencement of the quarter except establishment, tools and plant and contingent charges	6,07,640
2.	Cost of work done during the quarter	31,699
3.	Estimated cost of additional work found necessary during the quarter	5,75,941
4.	Estimated cost of completing the works from and after the end of quarter	5,75,941

MADRAS,
18th May 1893.

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

PROGRESS STATEMENT No. 32.

MADRAS HARBOUR WORKS.

STATEMENT showing progress during quarter ending 31st March 1893 as shown on accompanying tracing No. 31 (*a*) and 31 (*b*).

NOTE.—The figures in block type denote for comparison progress and quantity of work done in quarter ending 31st March 1892 when the pier work was founded at 34 feet below DeHavilland's mean sea-level.

No. of item.	Particulars and quantity of work, &c.	Sub-heads of work.	North pier. Rubble base.	North pier. Pier head founded at 40 feet below DeHavilland's mean sea-level	North pier. Wave-breaker.	North pier. Concrete capping.	North pier. Base protection.	South pier. Rubble base.	South pier. Pier head founded at 40 feet below DeHavilland's mean sea-level	South pier. Wave-breaker.	South pier. Concrete capping.	South pier. Base protection.	Railway lines. At works.	Railway lines. At quarries.	Railway lines. Sand line.	Railway lines. Beach improvements.	Pallivaram quarries outturn.	Block-making.	Protective works.	Total expenditure during the quarter 31st March 1893.
		Col.	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.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	3,414½	..
2	Do. do. from wagons ..	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6,864½	..
3	Total quantity rubble stone received on works ..	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8,740 6,864¼	..	..	..
4	Do. blasted chips do. ..	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
5	Concrete blocks set by divers	No.	..	161 120	..	..	..	..	72 73	..	..	..	..	..	..	..	..	..	..	..
6	Do. deposited in wave breaker ..	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
7	Do. made for superstructure ..	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
8	Do. do. pier head ..	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
9	Wrought iron cramp fixed in position ..	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
10	Total outturn of concrete	C. yd.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
11	Advance or progress of completed superstructure	Ry ft.	..	50′ 26″ 10½″	..	..	..	..	18⅓ 16′ 1½″	..	..	..	..	..	..	..	..	..	..	..
12	Rubble base protected with concrete ..	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
13	Metre gauge, 40 lb. per yard laid new ..	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
14	Do. do. relaid or renewed ..	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
15	Do. do. taken up ..	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
16	Broad gauge, 50 lb. per yard laid	,,	..	..	..	..	..	..	..	..	..	..	979 761	..	..	..	..	..	..	..
17	Do. do. relaid or renewed ..	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
18	Do. do. taken up ..	,,	..	..	..	..	..	..	..	..	..	..	950 Single line.	..	..	..	..	..	..	..
19	Titan gauge, 75 lb. per yard laid new ..	,,	..	..	..	..	..	..	..	..	..	..	3,402 161	..	..	..	..	..	..	..
20	Do. do. relaid or renewed ..	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
21	Do. do. taken up ..	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
22	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
23	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
24	Approximate expenditure under sub-heads of work ..	Rs.	...	11,063	..	..	750	..	9,326	..	..	..	..	..	..	..	8,193	— 290	2,657	31,699

					TONS.	CWTS.	QRS.	LB.		TONS.	CWTS.	QRS.	LB.
	Casks of cement received on works during quarter containing				..	..	..	..					
28⅓	do.	do.	issued for	do. do.	4	19	3	18	Quantity due on indents.		*Nil.*		
8,838	do.	do.	balance in store at end of quarter ending 31st March 1893	containing ..	1,677	10	1	13					

MADRAS,
18th May 1893.

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

1884-93/3

Comparison of expenditure to date with sanctioned estimate for the quarter ending 31st March 1893.

Sub-head of work.	As per estimate sanctioned in Secretary of State's despatch No. 1, dated 7th January 1892.					As executed.					Arrears not paid.	Value of work done up to date, columns 11 and 12.
	Quantity.	Rate.	Per.	Cost.	Total.	Quantity.	Rate.	Expenditure. Total up to end of last quarter.	During the quarter.	Up to date.		
1	2	3	4	5	6	7	8	9	10	11	12	13
Expenditure up to 31st December 1884.		Rs. A. P.		Rs.	Rs.		Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
1. Works	..	..	..	55,09,324		..	..	55,09,324 8 10	..	55,09,324 8 10	..	55,09,324 8 10
2. Establishment	..	..	..	5,29,904		..	..	5,29,904 0 0	..	5,29,904 0 0	..	5,29,904 0 0
3. Tools and plant	..	..	..	5,15,262		..	..	5,15,262 6 0	..	5,15,262 6 0	..	5,15,262 6 0
Total	..	..	..	..	65,54,490	..	..	65,54,490 14 10	..	65,54,490 14 10	..	65,54,490 14 10
Revised Estimate.												
4. Alteration and extension of block ground	Prely.	..	..	5,892	5,892	..	..	5,882 3 5	..	5,882 3 5	9 13 6	5,892 0 11
North Pier.												
5. Ordinary rubble deposited from breakwater	Tons.	13,930	1 12 0	Ton.	24,378	13,930	1 12 0	24,377 9 0	..	24,377 9 0	..	24,377 9 0
6. Ordinary rubble deposited from boats	,,	206,896	2 0 5	,,	4,19,218	208,362	2 1 5	4,30,966 8 3	..	4,30,966 8 3	4,404 12 2	4,25,371 4 5
7. Concrete blocks for building	C. yds.	51,320	11 8 0	C. yd.	5,90,110	48,340	11 14 1	5,48,817 12 5	25,436 9 5	5,74,254 5 10	..	5,74,254 5 10
8. Setting blocks at commencement of new work	,,	2,615	2 1 1	,,	5,415	2,615	2 1 1	5,414 11 2	..	5,414 11 2	..	5,414 11 2
9. Setting blocks from 2,200 to 3,000 feet	,,	36,520	2 14 3	,,	1,05,569	36,447	2 15 9	1,08,813 14 8	..	1,08,813 14 8	..	1,08,813 14 8
10. Setting blocks at pier head	,,	12,185	9 8 11	,,	1,16,424	9,308	8 13 0	79,529 15 0	2,085 5 10	79,615 4 10	2,414 2 6	82,029 7 4
11. Concrete in mass for filling	,,	263	4 8 3	,,	1,188	263	4 8 3	1,188 0 7	..	1,188 0 7	..	1,188 0 7
12. Wave-breaker blocks	,,	288	9 5 7	,,	2,692	288	9 5 7	2,692 0 0	..	2,692 0 0	..	2,692 0 0
13. Wave-breaker concrete blocks	,,	77,355	10 14 11	,,	8,45,591	67,905	11 6 4	7,63,593 3 2	..	7,63,593 3 2	..	7,63,593 3 2
14. Depositing concrete blocks	,,	77,932	1 0 0	,,	77,928	67,599	1 0 3	68,626 10 0	..	68,626 10 0	9 7 8	68,636 1 8
15. Concrete in protection to rubble base	,,	1,936	10 4 1	,,	20,358	1,212	16 4 7	15,504 12 6	4,165 2 5	19,669 14 11	69 5 8	19,739 4 7
16. Cramps, iron	No.	331	9 10 1	Each.	3,188	304	8 0 7	2,419 5 8	..	2,419 5 8	..	2,419 5 8
17. Concrete capping	C. yds.	16,352	11 3 10	C. yd.	1,83,793	573	19 13 10	11,393 14 7	..	11,393 14 7	..	11,393 14 7
18. Cost of north pier caisson and setting in position and filling same as items 26, 27, 33 and 34	,,	..	..	,,	84,750	..	..	20,748 7 9	24 11 9	20,773 3 6	..	20,773 3 6
Total for North Pier	..	..	..	..	..	24,80,607	..	..	29,75,086 12 9	38,711 13 5	24,13,798 10 2	6,807 12 0	21,20,596 6 2

South Pier.												
19. Ordinary rubble deposited from boats	Tons.	175,078	2 9 0	Ton.	4,49,952	170,774	2 9 10	4,41,668 9 0	..	4,41,668 9 0	4,925 14 8	4,46,594 7 8
20. Large rubble deposited from breakwater	,,	8,615	1 12 0	,,	15,075	8,615	1 12 0	15,075 13 0	..	15,075 13 0	..	15,075 13 0
21. Concrete blocks for building	C. yds.	45,066	11 3 1	C. yd.	5,04,510	40,481	11 4 8	4,41,659 11 2	15,416 12 9	4,57,120 7 11	..	4,57,120 7 11
22. Setting blocks at commencement	,,	2,556	3 1 6	,,	7,912	2,556	3 1 6	7,911 13 3	..	7,911 13 3	..	7,911 13 3
23. Setting blocks from 2,650 to 3,700 feet	,,	30,160	3 7 11	,,	1,05,461	30,160	3 7 11	1,05,461 9 4	..	1,05,461 9 4	..	1,05,461 9 4
24. Setting blocks at pier head	,,	12,350	11 1 3	,,	1,36,845	7,764	14 4 5	1,01,353 4 0	6,442 12 7	1,07,796 0 7	3,041 12 5	1,10,837 13 0
25. Concrete in mass for filling	,,	602	7 9 1	,,	4,655	602	7 9 1	4,554 14 4	..	4,554 14 4	..	4,554 14 4
26. Concrete in cylindrical pier head	,,	2,355	15 0 0	,,	35,325	..	..	..	..	..	..	..
27. Concrete in filling in between coursed blockwork and caisson	,,	184	15 0 0	,,	2,760	..	..	..	..	..	..	..
28. Wavebreaker concrete blocks	,,	47,231	11 1 6	,,	5,24,070	38,754	11 3 8	4,35,252 11 7	..	4,35,252 11 7	..	4,35,252 11 7
29. Depositing concrete blocks	,,	47,714	1 5 8	,,	64,708	39,237	1 6 5	55,053 15 4	..	55,053 15 4	..	55,053 15 4
30. Concrete in protection to rubble base	,,	1,700	9 10 6	,,	16,420	1,107	13 6 11	14,880 11 10	..	14,880 11 10	..	14,880 11 10
31. Cramps, iron	No.	259	11 7 7	Each.	2,972	214	10 12 1	2,302 2 4	..	2,302 2 4	..	2,302 2 4
32. Concrete capping	C. yds.	16,247	11 5 8	C. yd.	1,84,435	669	21 2 4	14,146 0 4	..	14,146 0 4	..	14,146 0 4
33. Iron caisson	No.	1	..	,,	18,000	..	..	21,750 6 1	..	21,750 6 1	..	21,750 6 1
34. Preparing base for and setting cylindrical pier head	,,	..	..	,,	23,665	..	..	..	..	..	..	..
Total for South Pier	..	..	..	..	..	21,00,826	..	..	16,61,071 9 7	21,903 9 4	16,82,975 2 11	7,967 11 1	16,90,942 14 0
Extending the Rubble Revetment protecting the Foreshore north of Harbour.												
35. Rubble stone revetment	Tons.	70,600	2 1 0	Ton.	1,45,613	81,817	1 8 11	1,16,568 4 3	4,378 13 9	1,20,947 2 0	6,460 9 7	1,27,407 11 7
36. Railway lines	..	..	..	..	9,849	..	..	10,914 10 10	..	10,914 10 10	..	10,914 10 10
Total	..	..	..	..	..	1,55,462	..	..	1,27,482 15 1	4,378 13 9	1,31,861 12 10	6,460 9 7	1,38,322 6 5
37. Tools and plant	..	..	..	..	..	6,11,656	..	..	6,39,534 7 6	2,835 14 2	6,42,370 5 8	508 15 4	6,42,879 5 0
38. Contingencies	..	..	..	..	..	2,17,415	..	..	1,74,685 8 4	5,699 15 6	1,80,385 7 10	7,242 2 10	1,87,627 10 8
39. Establishment	..	..	..	..	..	5,24,369	..	..	5,19,277 3 7	13,370 4 4	5,32,647 7 11	..	5,32,647 7 11
40. Materials at site (concrete blocks in yards)	C. yds.	..	..	..	..	..	11,350	14 7 1	1,99,265 5 8	—40,528 7 1	1,58,736 14 7	5,211 5 4	1,63,948 3 11

1884-93

Comparison of expenditure to date with sanctioned estimate for the quarter ending 31st March 1893—*cont.*

Sub-head of work.	As per estimate sanctioned in Secretary of State's despatch No. 1, dated 7th January 1892.					As executed.					Arrears not paid.	Value of work done up to date, columns 11 and 12.
	Quantity.	Rate.	Per.	Cost.	Total.	Quantity.	Rate.	Expenditure. Total up to end of last quarter.	Expenditure. During the quarter.	Expenditure. Up to date.		
1	2	3	4	5	6	7	8	9	10	11	12	13
Extending the Rubble Revetment protecting the Foreshore north of Harbour—cont.		Rs. A. P.		Rs.	Rs.		Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
41. Advances to work-people ..	..	..	..	..	..	..	..	6,016 15 9	..	6,016 15 9	..	6,016 15 9
Total of estimate and value of work done	..	..	..	..	61,05,227	..	..	54,03,303 1 8	46,371 15 5	54,54,675 1 1	34,298 5 8	54,88,973 6 9
Deduct probable recoveries due to sales of tools and plant ..	..	..	..	..	2,77,331	..	..	—67,396 1 9	—3,240 9 8	—70,636 11 5	..	—70,636 11 5
Total ..	..	..	..	..	58,28,896	..	..	53,40,906 15 11	43,131 5 9	53,84,038 5 8	34,298 5 8	54,18,336 11 4
Total of revised estimate sanctioned in Secretary of State's despatch plus expenditure before 31st December 1884	..	..	..	..	1,23,83,386	..	..	1,18,95,397 14 9	43,131 5 9	1,19,38,529 4 6	34,298 5 8	1,19,72,827 10 2
Estimated cost of additional works found necessary up to end of last quarter	..	..	..	..	..	..	..	..	..	..	..	..
Estimated cost of additional works found necessary during quarter ending	..	..	..	..	..	..	..	..	..	..	..	..
Total estimated cost for completion of works	..	..	..	..	1,23,83,386	..	..	..	..	..	..	..
Deduct total expenditure as per column 11	..	..	..	..	1,19,38,529	..	..	..	..	..	..	..
Total estimated cost of completing work after quarter ending 31st March 1893	..	..	..	..	4,44,857	..	..	..	..	..	..	..

	Rs.	A.	P.
Expenditure up to 31st March 1892 from commencement of works	1,16,47,374	1	1
Do. during current official year from 1st April 1892 to 31st March 1893 ..	2,91,155	5	5
Total outlay to 31st March 1893 ..	1,19,38,529	4	6

Grant for 1892-93, Rs. 5,77,000.

Madras,
29th April 1893.

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

21st July 1893, No. 1884 W., Public Works. 9

No. 1152, Marine.

Transferred to the Public Works Department.

Ootacamund,
30th June 1893.

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

Order—dated 21st July 1893, No. 1884 W., Public Works.

Ordered to be forwarded for the information of the Secretary of State and the Government of India.

[Here enter No. 1885 W., dated 21st July 1893.]

(True Extract.)

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

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

Encl. A. D. Xavier.
Spare Copies.

1884-93

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1893} Madras.

PUBLIC WORKS.

Dated July, 21st.

Read,

Encl.

G.O., 21st July 1893, No. 1884 W.

JULY.

Madras Harbour Works

The progress report of the — for quarter ending 31st March 1893 ordered to be forwarded for the information of the Secretary of State and the Government of India.

1884-55/6

21st July 1893, No. 1884 W., Public Works.

GOVERNMENT OF MADRAS.

PUBLIC WORKS DEPARTMENT.

Buildings and Roads.
Civil Works.

Read—the following paper :—

From J. STURROCK, Esq., I.C.S., Chairman, Harbour Trust Board, Madras, to the Chief Secretary to Government, dated Madras, 24th June 1893, No. 929.

I have the honour to submit, for the information of Government and for transmission to the Right Honorable the Secretary of State, report upon the progress of the Madras Harbour Works for the quarter ending 31st March 1893.

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 9th day of June 1893.

* * * * *

8. Read letter from the Board's Engineer, No. 111, dated 18th May, submitting report upon the progress made with harbour construction during the quarter ending 31st March 1893.

Recorded and resolved that this report be submitted to Government.

* * * * *

(True Extract.)

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

Report of progress on the Madras Harbour Works for the quarter ending 31st March 1893.

Accompanying this report are the following plans and statement :—

No. 31 (*a*).—A plan of the harbour to a scale of 200 feet to an inch showing in red the position and quantity of work done during the quarter. The contours in half fathoms shown on this plan are those of the last complete marine survey of 1889. The positions of the high water marks of the 31st March 1893 and that of the previous twelve months, both to the north of the revetment and the south of the harbour, are shown for comparison.

No. 31 (*b*).—A revised plan showing in detail the pier heads as now being constructed and the positions of the caissons for completing both piers of the harbour with an entrance of 520 feet.

No. 31 (*c*).—A statement comparing the expenditure on different sub-heads of work up to the end of the quarter with the provisions of the sanctioned estimate.

No. 31 (*d*).—A statement showing work done under different sub-heads and particulars of cement received and issued.

2. The various heads of work, &c., throughout the Harbour Works are reported in as follows.

3. *General.*—The quarter under review (January, February and March) is generally the most favorable one in the year for marine work, and, after deducting the Sundays and non-working days in the quarter, there remained 77 working days for sub-marine work should the weather have proved favorable; but as it happened, due to rough sea and other causes, there were only 63 days fit for work, and upon which progress was made at the north pier, and 57 days were available for work at the south pier; from the earliest date the crane could be got into position for block setting.

4. *North pier head.*—On the 9th January, fair weather had set in and the north pier titan crane was travelled out to commence work, with a steady run of 63 working days ahead before the crane need return to shore for the next monsoon. During the quarter fair weather favored the works and good progress was made.

5. Of the available 63 working days, 53 days were occupied in dredging the rubble base down to the required depth at which the pier head is founded and 11 days were taken up in levelling the beds by divers and setting five courses or 120 large blocks, which progress made an advance, to the completed work of 26′ 10½″ to the north pier head, at the widest and deepest section of the work.

6. With this report is submitted a large scale plan (*b*), 20 feet to an inch, and upon it is shown more clearly: in red the progress made during the quarter at the pier heads, as the usual plan accompanying these reports is upon a very small scale and it is difficult to show what is being done when so little advance above water level can be recorded; but, upon a minute examination of this plan, it will be seen that nearly all work in the future, until the completion of the pier heads, is under water and more difficult than it has hitherto been, but nevertheless steady and good progress is being made.

7. Two average cross sections of both of the ruined old pier heads are shown—one as the work was before reconstruction and as the storm of 1881 left it, and the second shows the work or section as reconstructed, or may be nearing completion under the sanctioned design.

8. From these sections it will be seen what an amount of dredging into the consolidated rubble base is necessary to found the piers at a safe level below wave action and also the great amount of *débris* and old block work which has to be removed by *divers* to make room for the new bonded superstructure and the solid cylindrical mass of concrete which is to terminate each pier head. The most difficult part of the whole of the work lies in the successful setting in position of these caissons and their thorough foundation and union with the old work.

9. Beyond the progress made during the quarter shown in red upon plan (*b*) there still remains two more permanent courses to be set at the north pier, or 10¾ feet of wall to be built, before the point is reached where the caisson is to be set, and of these two courses one has been set since the quarter closed.

10. After these two courses are set, which will be the last of the permanent work of the north pier, there will be still six courses of block work to be set [as shown on plan (*b*) in dotted lines] to enable the foundation or rubble base being prepared to receive the huge cylindrical mass of concrete to be made in the caissons; these courses, after having thoroughly compressed the base with their combined weights, are to be again raised and used as wavebreaker blocks and the base so compressed is to be the foundation upon which the caisson is to be lowered and when set rapidly filled with concrete at a time when a really smooth sea can be relied upon for at least ten days on end and this is only likely in the months of September or February.

11. Preparations are therefore being made in case progress should be rapid enough at the north pier to construct and set the north pier head caisson this September; otherwise the north pier head will not be completed till February next and then the north pier staff, cranes, and machinery will be available for any further work in constructing jetties, &c.

12. *South pier head.*—At the south pier there were 57 days during the quarter, upon which progress was possible under water, and of these days 23 were devoted to dredging down to the necessary depth at which the pier is founded and 26 days were occupied in raising, blasting, and removing pieces of the old overthrown blocks, &c., and 8 days went to setting 73 large special blocks which was the progress during the quarter of three completed courses as shown in red on plan (*b*) at the south pier head.

13. The advance of completed superstructure at this pier head was therefore 16′ 1½″ during the 57 working days.

14. This progress when considered with the fact that the base was dredged and so far ready at the end of the quarter, that another course or further advance was made to each pier head of 5′ 4½″ a few days later (not recorded in this report as the progress belongs to the following quarter), the work of the quarter under review must be considered excellent and rapid at these more difficult and wider portions of the work.

15. At this pier head there still remains 7 courses or 37½ feet of permanent work to be built before the temporary block work for the caisson is commenced upon as already explained under paragraph 10 of the north pier.

16. *North and south piers apron or protection to rubble base.*—At both piers, at intervals during the quarter, when dredging was not going on and the divers were not required at the pier heads, their labour was directed towards preparing the rubble base along both piers preparatory to receiving the concrete, forming the apron at the footing of the superstructure. A good length of the base was at the close of the quarter ready to receive the concrete as soon as the crane was available for the work.

17. *Foreshore north of the harbour.*—As reported in the quarterly report ending 31st December 1892, paragraphs 21 and 22, the revetment was found from the sections taken to be very much drawn down seawards; consequently on 11th January 1893 prompt measures were taken to make good the line of railway and to deposit stone where necessary to the extent of the balance of the sanctioned estimate.

18. Throughout the length of the new revetment A to C on plan 6,864¼ tons of large boulders were received from the Pallávaram quarries and deposited, forming as high a bank as possible tipped from the wagons. There only remains a small quantity of stone yet to be deposited to complete the already sanctioned estimate, but further feeding with large stone will be necessary before the close of the year; therefore sanction for a steady maintenance of this revetment should be accorded so that it can be made up where weak without any delay in referring for sanction. It is impossible to estimate the cost or quantity of stone required for upkeep of this work as it depends upon the action of the sea from time to time, but the main point is to have stone ready under sanction, to be deposited at few hours' notice to fill up each breach as it occurs, for the next year or so when this new line of revetment will settle down and consolidate as the old revetment has done.

19. The high water mark shown upon the plan indicates the usual advance of sea shore and accretion which takes place till about April, but the advance is getting less, thereby leaving the revetment exposed to the sea longer each year until finally it has to withstand the seas all the year round and until then the slope of the revetment is continually being washed down and must be made up from time to time until it stands at a natural slope as the old work has done.

20. *Foreshore south of and depth within the harbour.*—The depth within the harbour and at the entrance remains unaltered and due to the absence of any swell or surf inside the harbour; during the quarter the high water mark within the harbour has advanced slightly, due to the sand thrown up being able to stand at a greater slope; as soon as a rough sea or any wave motion again takes place inside the harbour this slope is flattened, which carries the high water mark further back for a time.

21. The accretion of sand to the south of the harbour does not make any or very little advance in this quarter, but what has been heaped up in the corner of the south arm of the harbour is carried south and the water line flattened as the high water mark of 31st March 1893.

22. *Miscellaneous—Work for the Harbour Trust Board, Traffic Department, &c.*—Eight new pier trucks were built and handed over to the Traffic Department capable of carrying loads up to 10 tons.

23. A timber watchman's shelter or look-out was built for Harbour Master's office and erected thereon; also the building was fenced in on both the east and west sides.

24. Forty-six notice boards of the Traffic Department rules were made, mounted and varnished and three latrines were re-erected on the bench and an old latrine on the iron pier was repaired.

25. Alterations were made to the Biden Home to accommodate the Third Harbour Master.

26. Several of the iron pier cranes were overhauled and repainted and all railway lines, &c., and in connection with the Traffic Department maintained in good working order.

The expenditure to the end of the quarter including establishment, tools and plant and contingencies is Rs. 1,19,38,529 out of a total estimated cost of Rs. 1,23,83,386, leaving a balance of Rs. 4,44,857 to be spent for completion.

MEMORANDUM to accompany statement of progress for the quarter ending 31st March 1893.

		Rs.
1.	Estimated sum required to complete the work at the commencement of the quarter except establishment, tools and plant and contingent charges	6,07,640
2.	Cost of work done during the quarter	31,699
3.	Estimated cost of additional work found necessary during the quarter	5,75,941
4.	Estimated cost of completing the works from and after the end of quarter	5,75,941

MADRAS,
18th May 1893.

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

PROGRESS STATEMENT No. 32.

MADRAS HARBOUR WORKS.

STATEMENT showing progress during quarter ending 31st March 1893 as shown on accompanying tracing No. 31 (*a*) and 31 (*b*).

No. of item.	Particulars and quantity of work, &c.	Sub-heads of work.	North pier. Rubble base.	North pier. Pier head founded at 40 feet below De Havilland's mean sea-level	North pier. Wave-breaker.	North pier. Concrete capping.	North pier. Base protection.	South pier. Rubble base.	South pier. Pier head founded at 40 feet below De Havilland's mean sea-level	South pier. Wave-breaker.	South pier. Concrete capping.	South pier. Base protection.	Railway lines. At works.	Railway lines. At quarries.	Railway lines. Sand line.	Railway lines. Beach improvements.	Pallivasam quarries outturn.	Block. Concrete making.	Protective works.	Total expenditure during the quarter 31st March 1893.
		Col.	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.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8,414¾	..
2	Do. do. from wagons ..	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	8,740	..	6,864¼	..
3	Total quantity rubble stone received on works ..	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	6,864½	..	..	..
4	Do. blasted chips do. ..	,,	..	..	..	..	..	..	72	..	..	..	..	..	..	..	..	..	..	..
5	Concrete blocks set by divers	No.	..	161	..	..	..	..	73	..	..	..	..	..	..	..	..	..	..	..
6	Do. deposited in wave breaker ..	,,	..	120	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
7	Do. made for superstructure ..	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
8	Do. do. pier head ..	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
9	Wrought iron cramp fixed in position ..	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
10	Total outturn of concrete	C. yd.	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
11	Advance or progress of completed superstructure.	Ry ft.	..	50′ 26″ 10½″	..	..	..	..	18½ 16′ 1½″	..	..	..	..	..	..	..	..	..	..	..
12	Rubble base protected with concrete ..	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
13	Metre gauge, 40 lb. per yard laid new ..	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
14	Do. do. relaid or renewed ..	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
15	Do. do. taken up ..	,,	..	..	..	..	..	..	..	..	..	..	979	..	..	..	..	..	..	..
16	Broad gauge, 50 lb. per yard laid	,,	..	..	..	..	..	..	..	..	..	..	761	..	..	..	..	..	..	..
17	Do. do. relaid or renewed ..	,,	..	..	..	..	..	..	..	..	..	..	950	..	..	..	..	..	..	..
18	Do. do. taken up ..	,,	..	..	..	..	..	..	..	..	..	..	Single line. 3,402	..	..	..	..	..	..	..
19	Titan gauge, 75 lb. per yard laid new ..	,,	..	..	..	..	..	..	..	..	..	..	161	..	..	..	..	..	..	..
20	Do. do. relaid or renewed ..	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
21	Do. do. taken up ..	,,	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
22	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
23	....	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
24	Approximate expenditure under sub-heads of work ..	Rs.	...	11,063	..	..	750	..	9,326	..	..	..	..	..	..	..	8,193	— 290	2,657	31,699

				TONS.	CWTS.	QRS.	LB.		TONS.	CWTS.	QRS.	LB.
Casks of cement received on works during quarter containing			.. .. ..	..	..	..	..					
	do.		.. .. ..	4	19	3	18	Quantity due on indents.	*Nil.*			
28⅗	do.	do. issued for	do.	1,577	10	1	13					
8,838	do.	do. balance in store at end of quarter ending 31st March 1893	containing ..									

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

MADRAS,
18th May 1893.

1884-93
8

Comparison of expenditure to date with sanctioned estimate for the quarter ending 31st March 1893.

Sub-head of work.	As per estimate sanctioned in Secretary of State's despatch No. 1, dated 7th January 1892.					As executed.					Arrears not paid.	Value of work done up to date, columns 11 and 12.
	Quantity.	Rate.	Per.	Cost.	Total.	Quantity.	Rate.	Expenditure. Total up to end of last quarter.	During the quarter.	Up to date.		
1	2	3	4	5	6	7	8	9	10	11	12	13
Expenditure up to 31st December 1884.		Rs. A. P.		Rs.	Rs.		Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
1. Works	..	..	..	55,09,324		..	..	55,09,324 8 10	..	55,09,324 8 10	..	55,09,324 8 10
2. Establishment	..	..	..	5,29,904		..	..	5,29,904 0 8	..	5,29,904 0 8	..	5,29,104 0 8
3. Tools and plant	..	..	..	5,15,262		..	..	5,15,262 6 0	..	5,15,262 6 0	..	5,15,262 6 0
Total ..	..	..	..	..	65,54,490	..	..	65,54,490 14 10	..	65,54,490 14 10	..	65,54,490 14 10
Revised Estimate.												
4. Alteration and extension of block ground .. Prely.	..	..	..	5,892	5,892	..	..	5,882 3 5	..	5,882 3 5	9 12 6	5,892 0 11
North Pier.												
5. Ordinary rubble deposited from breakwater .. Tons.	13,930	1 12 0	Ton.	24,377		13,930	1 12 0	24,377 9 0	..	24,377 9 0	..	24,377 9 0
6. Ordinary rubble deposited from boats .. .. ,,	266,896	2 0 5	,,	4,19,278		268,382	2 1 5	4,20,966 8 3	..	4,20,966 8 3	4,404 12 2	4,25,371 4 5
7. Concrete blocks for building .. .. C. yds.	51,320	11 8 0	C. yd.	5,90,110		49,340	11 14 1	5,48,817 12 5	25,436 9 8	5,74,254 5 10	..	5,74,254 5 10
8. Setting blocks at commencement of new work .. ,,	2,615	2 1 1	,,	5,415		2,615	2 1 1	5,414 11 2	..	5,414 11 2	..	5,414 11 2
9. Setting blocks from 2,200 to 2,600 feet .. .. ,,	36,520	2 14 3	,,	1,05,564		35,447	2 15 9	1,08,813 14 8	..	1,08,813 14 8	..	1,08,813 14 8
10. Setting blocks at pier head .. ,,	12,185	9 8 11	,,	1,16,424		9,308	8 13 0	70,329 15 0	9,085 5 10	79,615 4 10	2,414 2 6	82,029 7 4
11. Concrete in mass for filling .. .. ,,	263	4 8 3	,,	1,189		263	4 8 3	1,188 0 7	..	1,188 0 7	..	1,188 0 7
12. Wave-breaker blocks .. ,,	288	9 5 7	,,	2,692		288	9 5 7	2,692 0 0	..	2,692 0 0	..	2,692 0 0
13. Wave-breaker concrete blocks .. .. ,,	77,355	10 14 11	,,	8,45,591		67,005	11 6 4	7,63,593 3 2	..	7,63,593 3 2	..	7,63,593 3 2
14. Depositing concrete blocks. ,,	77,972	1 0 0	,,	77,928		67,599	1 0 3	68,626 10 0	..	68,626 10 0	9 7 8	68,636 1 8
15. Concrete in protection to rubble base	1,986	10 4 1	..	20,358		1,212	16 4 7	15,504 12 6	4,165 3 5	19,669 14 11	69 6 8	19,739 4 7
16. Cramps, iron .. .. No.	331	9 10 1	Each.	3,188		301	8 0 7	2,419 5 8	..	2,419 5 8	..	2,419 5 8
17. Concrete capping .. C. yds.	16,352	11 3 10	C. yd.	1,83,798		673	19 13 10	11,393 14 7	..	11,393 14 7	..	11,393 14 7
18. Cost of north pier caisson and setting in position and filling same as items 26, 27, 33 and 34 .. ,,	..	..	..	84,780		..	..	20,748 7 9	24 11 9	20,773 3 6	..	20,773 3 6
Total for North Pier ..	..	..	..	..	34,80,807	..	..	20,75,086 12 9	33,711 13 5	21,13,798 10 2	6,897 12 0	21,20,696 6 2

South Pier.												
19. Ordinary rubble deposited from boats .. .. Tons.	175,078	2 9 0	Ton.	4,49,052		170,774	2 9 10	4,41,668 9 0	..	4,41,668 9 0	4,925 14 8	4,46,594 7 8
20. Large rubble deposited from breakwater .. ,,	8,615	1 12 0	,,	15,076		8,615	1 12 0	15,075 13 0	..	15,075 13 0	..	15,075 13 0
21. Concrete blocks for building .. .. C. yds.	45,066	11 3 1	C. yd.	5,04,510		40,481	11 4 8	4,41,659 11 2	15,416 12 9	4,57,120 7 11	..	4,57,120 7 11
22. Setting blocks at commencement .. .. ,,	2,556	3 1 6	,,	7,912		2,556	3 1 6	7,911 13 3	..	7,911 13 3	..	7,911 13 3
23. Setting blocks from 2,550 to 3,700 feet .. .. ,,	30,160	3 7 11	,,	1,05,461		30,160	3 7 11	1,05,461 9 4	..	1,05,461 9 4	..	1,05,461 9 4
24. Setting blocks at pier head .. .. .. ,,	12,350	11 1 3	,,	1,36,845		7,764	14 4 5	1,01,353 4 0	6,442 12 7	1,07,796 0 7	3,041 12 5	1,10,837 13 0
25. Concrete in mass for filling .. .. .. ,,	602	7 9 1	,,	4,555		602	7 9 1	4,554 14 4	..	4,554 14 4	..	4,554 14 4
26. Concrete in cylindrical pier head .. .. .. ,,	2,355	15 0 0	,,	35,325		..	..	..	..	..	..	..
27. Concrete in filling in between coursed blockwork and caisson .. ,,	184	15 0 0	,,	2,760		..	..	..	..	..	..	..
28. Wavebreaker concrete blocks .. .. .. ,,	47,231	11 1 6	,,	5,24,070		38,754	11 3 8	4,35,252 11 7	..	4,35,252 11 7	..	4,35,252 11 7
29. Depositing concrete blocks .. .. .. ,,	47,714	1 5 8	,,	64,708		39,237	1 6 5	55,053 15 4	..	55,053 15 4	..	55,053 15 4
30. Concrete in protection to rubble base .. .. ,,	1,700	9 10 6	,,	16,420		1,107	13 6 11	14,880 11 10	..	14,880 11 10	..	14,880 11 10
31. Cramps, iron .. .. No.	259	11 7 7	Each.	2,972		214	10 12 1	2,302 2 4	..	2,302 2 4	..	2,302 2 4
32. Concrete capping .. C. yds.	16,247	11 5 8	C. yd.	1,84,495		669	21 2 4	14,146 0 4	..	14,146 0 4	..	14,146 0 4
33. Iron caisson .. .. .. No.	1	..	,,	18,000		..	..	21,750 6 1	..	21,750 6 1	..	21,750 6 1
34. Preparing base for and setting cylindrical pier head .. .. .. ,,	..	..	,,	28,665		..	..	..	..	..	..	..
Total for South Pier ..	..	..	..	..	21,00,826	..	..	16,61,071 9 7	21,903 9 4	16,82,975 2 11	7,967 11 1	16,90,942 14 0
Extending the Rubble Revetment protecting the Foreshore north of Harbour.												
35. Rubble stone revetment .. Tons.	70,600	2 1 0	Ton.	1,45,613		81,817	1 8 11	1,16,568 4 3	4,378 13 9	1,20,947 2 0	6,460 9 7	1,27,407 11 7
36. Railway lines	..	..	..	9,849		..	..	10,914 10 10	..	10,914 10 10	..	10,914 10 10
Total ..	..	..	..	..	1,55,462	..	..	1,27,482 15 1	4,378 13 9	1,31,861 12 10	6,460 9 7	1,38,322 6 5
					6,11,656	..	..	6,39,534 7 6	2,835 14 2	6,42,370 5 8	508 15 4	6,42,879 5 0
37. Tools and plant	..	..	..	..	2,17,415	..	..	1,74,685 8 4	5,699 15 6	1,80,385 7 10	7,242 2 10	1,87,627 10 8
38. Contingencies	..	..	..	..	5,34,369	..	..	5,19,277 3 7	13,370 4 4	5,32,647 7 11	..	5,32,647 7 11
39. Establishment	..	..	..	..		..	..					
40. Materials at site (concrete blocks in yards) .. C. yds.	..	..	..	..	..	..	11,350 14 7 1	1,90,265 5 8	—40,528 7 1	1,58,736 14 7	5,211 5 4	1,63,948 3 11

1884-89
9

Comparison of expenditure to date with sanctioned estimate for the quarter ending 31st March 1893—*cont.*

Sub-head of work.	As per estimate sanctioned in Secretary of State's despatch No. 1, dated 7th January 1892.				As executed.			Arrears not paid.	Value of work done up to date, columns 11 and 12.
	Quantity.	Rate.	Per.	Cost.	Total.	Quantity.	Rate.	Expenditure.			
								Total up to end of last quarter.	During the quarter.	Up to date.	
1	2	3	4	5	6	7	8	9	10	11	12	13
		Rs. A. P.		Rs.	Rs.		Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
Extending the Rubble Revetment protecting the Foreshore north of Harbour—cont.												
41. Advances to work-people ..	..	..	..	..	..	..	..	..	..	6,016 15 9	..	6,016 15 9
Total of estimate and value of work done	..	..	..	..	..	..	..	54,08,303 1 8	46,371 15 6	54,54,675 1 1	34,293 5 8	64,88,972 6 9
Deduct probable recoveries due to sale of tools and plant ..	..	..	..	..	..	..	..	—67,396 1 9	—3,240 9 8	—70,636 11 5	..	—70,636 11 5
Total ..	..	..	..	..	..	..	..	53,40,906 15 11	43,131 6 0	53,84,038 5 5	34,293 5 8	64,18,336 11 4
Total of revised estimate sanctioned in Secretary of State's despatch plus expenditure before 31st December 1884	..	..	..	..	..	..	..	1,15,05,397 14 9	43,131 6 0	1,19,38,529 4 6	34,293 5 8	1,19,72,827 10 2
Estimated cost of additional works found necessary up to end of last quarter	..	..	..	..	..	..	..	..	..	..	..	..
Estimated cost of additional works found necessary during quarter ending	..	..	..	..	..	..	..	..	..	..	..	..
Total estimated cost for completion of works	..	..	..	..	..	..	..	..	..	..	..	..
Deduct total expenditure as per column 11	..	..	..	..	..	..	..	..	..	..	..	..
Total estimated cost of completing work after quarter ending 31st March 1893	..	..	..	..	..	..	..	..	..	..	..	..

Expenditure up to 31st March 1892 from commencement of works .. Rs. 1,16,47,374 1 1
Do. during current official year from 1st April 1892 to 31st March 1893 .. 2,91,155 3 6
Total outlay to 31st March 1893 .. 1,19,38,529 4 6

Grant for 1892-93, Rs. 5,77,000.

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

Madras,
29th April 1893.

No. 1152, Marine.

Transferred to the Public Works Department.

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

Ootacamund,
30th June 1893.

Order—dated 21st July 1893, No. 1884 W., Public Works.

Ordered to be forwarded for the information of the Secretary of State and the Government of India.

[Here enter No. 1885 W., dated 21st July 1893.]

(True Extract.)

(Signed) J. HANNAN,
Ag. Joint Secy. to Govt., P.W.D.,
General, Buildings and Roads Branch.

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

Endorsement—dated 21st July 1893, No. 1885 W., Public Works.

Copy of the above, with a plan showing the progress of the work, forwarded to the Government of India.

(By Order.)

(Signed) J. HANNAN,
Ag. Joint Secy. to Govt., P.W.D.,
General, Buildings and Roads Branch.

Exd. A. D. Xavier.
Spare Copies

1884-93/10

BUILDINGS AND ROADS.
CIVIL WORKS.

Govt. of {1893} Madras.

PUBLIC WORKS.

Dated July, 21st.

Recd. *Encl.*

G.O., 21st July 1893, Nos. 1884, 1885 W.

JULY.

Madras Harbour Works

Forwarding copy of the progress report of the — for quarter ending 31st March 1893 together with a plan showing progress of the work.

1884-93
No 11

21st July 1893, No. $\frac{6}{1884}$ 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. $\frac{3}{1018}$ W., dated 13th April 1893, we have the honour to forward, herewith, the progress report of the Madras Harbour Works for the quarter ending 31st March 1893.

2. The report is accompanied by two plans showing the position and quantity of work done during the quarter.

We have the honour to be,

My Lord,

Your Lordship's most obedient, humble servants,

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

Ootacamund,
21st July 1893.

Exd. A. D Xavier.

GOVT. OF MADRAS.

PUBLIC WORKS DEPARTMENT.

(Copy.)

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

No. $\frac{6}{1884\ W.}$ dated 21st July 1893.

FORWARDING the progress report of the Madras Harbour Works for quarter ending 31st March 1893 together with two plans showing the position and quantity of work done during the quarter

MARINE DEPARTMENT

FROM

THE CHAIRMAN,
Harbour Trust Board.

To

THE CHIEF SECRETARY TO GOVERNMENT,
Marine Department.

DATED 26TH JUNE

DESPATCHED 27

RECEIVED 28

ENCLOSURE TWO PLANS

SUBJECT.

MADRAS HARBOUR.

Submitting Report upon the progress upon the
for the quarter ending 31st
March 1893

1884-85
14

MARINE DEPARTMENT.

FROM

THE CHAIRMAN,

HARBOUR TRUST BOARD,

MADRAS.

TO

THE CHIEF SECRETARY TO GOVERNMENT,

Marine Department.

DATED 24TH JUNE

DESPATCHED 27th June 1893.

RECEIVED

ENCLOSURE TWO PLANS (in duplicate)

No. 929

SUBJECT.

MADRAS HARBOUR.

—o—

Submitting Report upon the progress upon the _____ for the quarter ending 31st March 1893.

V

LAWRENCE ASYLUM PRESS.

1884-85
16

No. 929

From

JOHN STURROCK, Esquire, I.C.S.,
Chairman, Harbour Trust Board,
Madras.

To

The Hon'ble Mr. J. F. PRICE, I.C.S.,
Chief Secretary to Government,
Marine Department.

Sir,

I have the honor to submit for the information of Government and for transmission to the Right Honorable the Secretary of State report upon the progress of the Madras Harbour Works for the Quarter ending 31st March 1893.

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

Chairman, Harbour Trust Board.

Extract of Proceedings of the Trustees of the Harbour of Madras, at a Meeting held at the Offices of the Board on Friday the 9th day of June 1893.

* * *

8. Read letter from the Board's Engineer, No. 111 dated 18th May, submitting report upon the progress made with Harbour construction during the Quarter ending 31st March 1893.

Recorded, and resolved,—that this report be submitted to Government.

* * *

(True Extract.)

C. PINGENT,
Secretary, Harbour Trust Board.

Report of Progress on the Madras Harbour Works for the Quarter ending 31st March 1893.

Accompanying this report are the following plans and statement:—

No. 31 (*a*) A plan of the Harbour to a scale of 200 feet to an inch, showing in red the position and quantity of work done during the quarter. The contours in half fathoms, shown on this plan are those of the last complete Marine Survey of 1889. The positions of the high water marks of the 31st March 1893 and that of the previous twelve months, both to the North of the revetment and the South of the Harbour, are shown for comparison.

No. 31 (*b*) A revised plan showing in detail the Pier Heads as now being constructed, and the positions of the caissons for completing both Piers of the Harbour, with an entrance of 520 feet.

(*c*) A statement comparing the expenditure on different sub-heads of work up to the end of the quarter with the provisions of the sanctioned estimate.

(*d*) A statement showing work done under different sub-heads and particulars of cement received and issued.

2. The various heads of work &c., throughout the Harbour Works are reported in as follows.

3. **General.**—The quarter under review January, February and March, is generally the most favourable one in the year for marine work, and after deducting the Sundays and non-working days in the quarter, there remained 77 working days for sub-marine work, should the weather have proved favourable; but as it happened, due to rough sea, and other causes, there were only 63 days fit for work; and upon which progress was made at the North Pier; and 57 days were available for work at the South Pier, from the earliest date the crane could be got into position for block setting.

4. **North Pier Head.**—On the 9th January, fair weather had set in, and the North Pier Titan Crane was travelled out to commence work; with a steady run of 63 working days ahead, before the Crane need return to shore for the next monsoon. During the quarter fair weather favoured the works, and good progress was made.

5. Of the available 63 working days, 53 days were occupied in dredging the rubble base down to the required depth at which the Pier Head is founded, and 11 days were taken up in levelling the beds by Divers and setting 5 courses or 120 large blocks; which progress, made an advance, to the completed work of 26'—10½" to the North Pier Head, at the widest and deepest section of the work.

6. With this report is submitted a large scale plan, (*b*) 20 feet to an inch, and upon it is shown more clearly: in red the progress made during the quarter at the Pier Heads, as the usual plan accompanying these reports is upon a very

small scale, and it is difficult to show what is being done, when so little advance above water level can be recorded; but upon a minute examination of this plan it will be seen that nearly all work in the future, until the completion of the Pier Heads, is under water and more difficult than it has hitherto been, but nevertheless steady and good progress is being made.

7. Two average cross sections of both of the ruined old Pier Heads are shown, one as the work was before reconstruction and as the storm of 1881 left it; and the second, shows the work, or section, as reconstructed; or may be, nearing completion under the sanctioned design.

8. From these sections it will be seen what an amount of dredging into the consolidated rubble base is necessary, to found the Piers at a safe level, below wave action, and also the great amount of debris and old blockwork which has to be removed by *Divers* to make room for the new bonded superstructure and the solid cylindrical mass of concrete which is to terminate each Pier Head. The most difficult part of the whole of the work lies in the successful setting in position of these caissons and, their thorough foundation, and union with the old work.

9. Beyond the progress made during the quarter, shown in red upon plan (*b*) there still remains two more permanent courses to be set at the North Pier, or 10¾ feet of wall to be built, before the point is reached where the caisson is to be set and of these two courses, one has been set since the quarter closed.

10. After these two courses are set, which will be the last of the permanent work of the North Pier, there will be still six courses of blockwork to be set (as shown on plan *b* in dotted lines) to enable the foundation or rubble base being prepared to receive the huge cylindrical mass of concrete to be made in the caissons; these courses after having thoroughly compressed the base with their combined weights, are to be again raised and used as wavebreaker blocks and the base so compressed, is to be the foundation upon which the caisson is to be lowered and when set, rapidly filled with concrete, at a time when a really smooth sea can be relied upon for at least 10 days on end and this is only likely in the months of September or February.

11. Preparations are therefore being made, in case progress should be rapid enough at the North Pier, to construct and set the North Pier Head Caisson this September, otherwise the North Pier Head will not be completed till February next and then the North Pier staff, cranes, and machinery will be available for any further work, in constructing jetties &c.

12. **South Pier Head.**—At the South Pier there were 57 days during the quarter, upon which progress was possible under water, and of these days 23 were devoted to dredging down to the necessary depth at which the Pier is founded, and 26 days were occupied in raising, blasting, and removing pieces of the old overthrown blocks, &c., and 8 days went to setting 73 large special blocks which was the progress during the quarter of 3 completed courses as shown in red on plan (*b*) at the South Pier Head.

13. The advance of completed superstructure at this Pier Head was therefore 16'—1½" during the 57 working days.

14. This progress when considered with the fact that the base was dredged and so far ready at the end of the Quarter, that another course, or further advance was made to each Pier Head, of 5'–4½" a few days later (not recorded in this report as the progress belongs to the following quarter) the work of the quarter under review, must be considered excellent and rapid at these more difficult and wider portions of the work.

15. At this Pier Head there still remains 7 courses or 37½ feet of permanent work to be built, before the temporary blockwork for the caisson, is commenced upon, as already explained under para. 10 of the North Pier.

16. **North and South Piers Apron or protection to Rubble Base.**—At both Piers, at intervals during the quarter, when dredging was not going on and the Divers were not required at the Pier Heads, their labor was directed towards preparing the rubble base along both Piers, preparatory to receiving the concrete; forming the Apron at the footing of the superstructure. A good length of the base was at the close of the quarter ready to receive the concrete, as soon as the crane was available for the work.

17. **Foreshore North of the Harbour.**—As reported in the Quarterly Report ending 31st December 1892 paras. 21 and 22, the revetment was found from the sections taken, to be very much drawn down, seawards; consequently on 11th January 1893, prompt measures were taken to make good the line of railway, and to deposit stone where necessary to the extent of the balance of the sanctioned Estimate.

18. Throughout the length of the new revetment A to C on plan 6864 tons of large boulders, were received from the Pallaveram Quarries, and deposited; forming as high a bank as possible; tipped from the wagons. There only remains a small quantity of stone yet to be deposited, to complete the already sanctioned estimate, but further feeding with large stone will be necessary, before the close of the year; therefore sanction for a steady maintenance of this revetment should be accorded, so that it can be made up where weak, without any delay in referring for sanction. It is impossible to estimate the cost or quantity of stone required for up keep of this work, as it depends upon the action of the sea from time to time, but the main point, is to have stone ready, under sanction; to be deposited at few hours notice to fill up each breach as it occurs; for the next year or so, when this new line of revetment will settle down and consolidate as the old revetment has done.

19. The high water mark shown upon the plan; indicates the usual advance of sea shore and accretion, which takes place till about April, but the advance is getting less, thereby leaving the revetment exposed to the sea longer each year; until finally it has to withstand the seas all the year round, and until then, the slope of the revetment is continually being washed down and must be made up from time to time until it stands at a natural slope as the old work has done.

20. **Foreshore South of and depth within the Harbour.**—The depth within the Harbour and at the entrance remains unaltered, and due to the absence of any swell or surf inside the Harbour during the quarter the high water mark within the Harbour, has advanced slightly, due to the sand thrown up being able

to stand at a greater slope, as soon as a rough sea or any wave motion again takes place inside the Harbour this slope is flattened, which carries the high water mark further back for a time.

21. The accretion of sand to the south of the Harbour does not make any, or very little advance in this quarter, but what has been heaped up in the corner of the south arm of the Harbour is carried south and the water line flattened, as the high water mark of 31st March 1893.

Miscellaneous.—Work for the Harbour Trust Board, Traffic Department, &c.

22. Eight new Pier trucks were built and handed over to the Traffic Department, capable of carrying loads up to 10 tons.

23. A timber watchman's shelter or look out was built for Harbour Master's, Office and erected thereon, also the building was fenced in, on both the east and west sides.

24. Forty-six notice Boards of the Traffic Department rules were [made mounted and varnished and three latrines were re-erected on the Beach and an old latrine on the Iron Pier was repaired.

25. Alterations were made to the Biden Home to accomodate the third Harbour Master.

26. Several of the Iron Pier cranes were over hauled and repainted and all Railway lines, &c., and in connection with the Traffic Department maintained in good working order.

The expenditure to the end of the quarter including establishment tools and plant and contingencies is Rs. 1,19,38,529 out of a total estimated cost of Rs. 1,23,83,386 leaving a balance of Rs. 4,44,857 to be spent for completion.

Memorandum to accompany statement of progress for the quarter ending 31st March 1893.

1.	Estimated sum required to complete the work at the commencement of the quarter except establishment, tools and plant and contingent charges.	6,07,640
2.	Cost of work done during the quarter.	31,699
		5,75,941
3.	Estimated cost of additional work found necessary during the quarter-	
4.	Estimated cost of completing the works from and after the end of quarter.	Rs. 5,75,941

HARBOUR WORKS OFFICE
MADRAS, 18*th May*, 1893.

A. LEE POGSON,
Engineer, Harbour Trust Board.

Progress Statement No. 32.

MADRAS HARBOUR WORKS.

Statement Showing Progress during Quarter ending 31st March 1893 as shown on accompanying Tracing No. 31 (a) and 31 (b).

NOTE.—The Figures in red denote for comparison progress and quantity of work done in Quarter ending 31st March 1892, when the Pier work was founded at 34 feet below De Havilland's mean Sea level.

No. of Item.	Particulars and Quantity of Work, &c.	Cubic.	North Pier. A	B	C	D	E	South Pier. F	G	H	I	J	Railway Lines. K	L	M	N	O	P	Q	R
		Sub-heads of Work.	Rubble Base.	Pier Head founded at 40 ft. below De Havilland's mean Sea level.	Wavebreaker.	Concrete Capping.	Base Protection.	Rubble Base.	Pier Head founded at 40 ft. below De Havilland's mean Sea level.	Wavebreaker.	Concrete Capping.	Base Protection.	At Works.	At Quarries.	Sand Line.	Beach Improvements.	Pallavaram Quarries Opttrn.	Concrete Blockmaking.	Protective Works.	Total Expenditure during the Quarter, 31st March 1893.
1	Rubble Stone deposited from boats ...	Tons...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	8,414	
2	Do. do. from wagons...	„ ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...		...	6,864	
3	Total quantity Rubble Stone received on Works	„ ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	8,740 6,864	...	...	
4	Do. Blasted Chips do.	„ ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
5	Concrete Blocks—Set by Divers ...	Number	...	161 120	...	...	...	...	72 78	...	...	...	...	...	...	...	...	...	...	
6	Do. Deposited in Wavebreaker	„ ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
7	Do. made for Superstructure	„ ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
8	Do. do. Pier Head	„ ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
9	Wrought Iron Cramp fixed in position	„ ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
10	Total out-turn of Concrete ...	Cubic yards ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
11	Advance or progress of completed superstructure ...	Ry. feet.	...	50' 26'—10½"	...	...	...	...	181 16'—11"	...	...	...	...	...	...	...	...	...	...	
12	Rubble Base protected with Concrete	„ ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
13	Metre Gauge, 40 lbs. per yard laid new	Ry. feet.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
14	Do. do. relaid or renewed	„ ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
15	Do. do. taken up	„ ...	...	...	...	...	...	...	...	...	...	...	979 761	...	...	...	...	...	...	
16	Broad Gauge, 50 lbs. per yard laid	„ ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
17	Do. do. relaid or renewed	„ ...	...	...	...	...	...	...	...	...	...	...	950 Single line	...	...	...	...	...	...	
18	Do. do. taken up	„ ...	...	...	...	...	...	...	...	...	...	...	3,402 161	...	...	...	...	...	...	
19	Titan Gauge, 75 lbs. per yard laid new	„ ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
20	Do. do. relaid or renewed	„ ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
21	Do. do. taken up	„ ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	
22																				
23																	8,193	290	2,657	31,699
24	Approximate Expenditure under Sub-heads of Work ...	Rupees...	...	11,063	...	...	750	...	9,326	...	...	...	...	...	...	...				

				Tons.	Cwts.	Qrs.	lbs.		Tons.	Cwts.	Qrs.	lbs.
Casks of Cement received on Works during	Nil.	containing	...	...	...	...	Quantity due on Indents.	Nil.				
Do. do. issued for do.	Quarter	...	...	4	19	3	18					
Do. do. Balance in Store at end of Quarter ending 31st March 1893		...	...	1,577	10	1	13					

A. LEE POGSON,
Engineer, Harbour Trust Board.

MADRAS 18th *May* 1893.

MADRAS HARBOUR WORKS.

COMPARISON OF EXPENDITURE TO DATE WITH SANCTIONED ESTIMATE FOR THE QUARTER ENDING 31st MARCH 1893.

Sub-head of Work.	As per Estimate Sanctioned in Secretary of State Despatch No. 1, dated 7th January 1892.					As Executed.					Arrears not paid.	Value of work done up to date, columns 11 and 12.		Remarks
						Quantity.	Rate.	Expenditure.						
	Quantity.	Rate.	Per.	Cost.	Total.			Total up to end of last Quarter.	During the Quarter.	Up to date.				
1	2	3	4	5	6	7	8	9	10	11	12	13		14
		Rs. a. p.		Rs.	Rs.		Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.		
Expenditure up to 31st December 1884.														
1 Works	.....	.....	.....	55,09,324		...	...	55,09,324 8 10	...	55,09,324 8 10	...	55,09,324 8 10		
2 Establishment	.....	.....	.....	5,29,904		...	...	5,29,904 0 0	...	5,29,904 0 0	...	5,29,904 0 0		
3 Tools and Plant	.....	.....	.....	5,15,262		...	...	5,15,262 6 6	...	5,15,262 6 6	...	5,15,262 6 6		
Total	.....	.....	.....		65,54,490	...	...	65,54,490 14 10	...	65,54,490 14 10	...	65,54,490 14 10		
Revised Estimate.														
4 Alteration and extension of block ground	.....	.....	.....	5,892	5,892	...	...	5,882 5 5	...	5,882 2 5	9 13 6	5,892 0 11		
North Pier.														
5 Ordinary rubble deposited from breakwater	Tons	13,860	1 12 6	Ton	24,378	13,930	1 12 6	24,377 9 6	... ...	24,377 9 6	... ...	24,377 9 6		
6 Do. from boats	,,	2,96,896	2 0 5	,,	4,19,218	2,98,367	2 1 5	4,30,966 8 3	... ...	4,30,966 8 3	4,404 12 2	4,35,371 4 5		
7 Concrete blocks for building	C. yds.	51,320	11 8 0	C. yd.	5,90,119	45,840	11 14 1	5,48,817 12 5	25,456 9 5	5,74,254 5 10	... ...	5,74,254 5 10		
8 Setting blocks at commencement of new work	,,	2,615	2 1 1	,,	5,415	2,615	2 1 1	5,414 11 2	... ...	5,414 11 2	... ...	5,414 11 2		
9 Do. from 2,200 to 3,600 feet	,,	36,520	2 14 3	,,	1,05,539	36,447	2 15 9	1,08,813 14 8	... ...	1,08,813 14 8	... ...	1,08,813 14 8		
10 Do. at Pierhead	,,	12,135	9 8 11	,,	1,16,434	9,508	8 13 0	70,529 15 0	9,085 5 10	79,615 4 10	2,414 2 6	82,029 7 4		
11 Concrete in mass for filling	,,	263	4 8 3	,,	1,188	263	4 8 3	1,188 0 7	... ...	1,188 0 7	... ...	1,188 0 7		
12 Wavebreaker blocks	,,	288	9 5 7	,,	2,692	288	9 5 7	2,692 0 0	... ...	2,692 0 0	... ...	2,692 0 0		
13 Do. concrete blocks	,,	77,356	10 14 11	,,	8,45,591	67,995	11 6 4	7,63,593 3 2	... ...	7,63,593 3 2	... ...	7,63,593 3 2		
14 Depositing do.	,,	77,932	1 0 0	,,	77,928	67,599	1 0 3	68,626 10 9	... ...	68,626 10 9	9 7 8	68,636 1 5		
15 Concrete in protection to Rubble Base	,,	1,986	10 4 1	,,	20,358	1,212	16 4 7	15,504 12 6	4,165 2 5	19,669 14 11	69 5 8	19,739 4 7		
16 Cramps, Iron	No.	331	9 10 1	Each	3,188	301	8 0 7	2,419 5 8	... ...	2,419 5 8	... ...	2,419 5 8		
17 Concrete capping	C. yds.	16,332	11 3 10	C. yd.	1,80,798	575	19 13 10	11,393 14 7	... ...	11,393 14 7	... ...	11,393 14 7		
18 Cost of North Pier Caisson and setting in position and filling same as items 26, 27, 33 and 34	...	...	...	...	84,750	...	...	20,748 7 9	24 11 9	20,773 3 6	... ...	20,773 3 6		
Total for North Pier	...	...	...	...	...			20,75,086 12 9	38,711 13 5	21,13,798 10 2	6,897 12 0	21,20,696 6 2		
South Pier.														
19 Ordinary rubble deposited from boats	Tons	1,75,078	2 8 0	,,	15,075	9,316	1 12 8	15,075 13 0	... ...	15,075 13 0	... ...	15,075 13 0		
20 Large do. deposited from breakwater	,,	3,613	1 12 0	,,	5,424	40,481	11 4 5	4,41,632 13 2	15,416 12 9	4,57,120 7 11	... ...	4,57,120 7 11		
21 Concrete blocks for building	C. yds.	45,066	11 3 1	C. yd.	5,04,510	3,555	3 1 6	7,911 13 3	... ...	7,911 13 3	... ...	7,911 13 3		
22 Setting blocks at commencement	,,	3,555	2 7 0	,,	7,932	90,199	2 7 11	1,05,461 1 3	... ...	1,05,461 1 3	... ...	1,05,461 1 3		
23 Do. from 2,550 to 3,700 feet	,,	30,160	3 7 11	,,	1,05,861	7,764	14 4 5	1,01,353 4 0	5,442 12 7	1,06,795 0 7	3,841 13 5	1,10,637 13 0		
24 Do. at Pierhead	,,	12,350	12 1 3	,,	1,36,845	602	7 9 1	4,554 14 3	... ...	4,554 14 3	... ...	4,554 14 3		
25 Concrete in mass for filling	,,	600	6 1 0	,,	4,555	...	...	...	...	...	...	...		
26 Do. in Cylindrical Pierhead	,,	2,350	15 0 0	,,	35,325	...	...	...	...	...	...	...		
27 Do. in filling in between Coursed Block-work and Caisson	,,	184	15 0 0	,,	2,760	...	...	...	...	...	...	...		
28 Wavebreaker concrete blocks	,,	47,381	11 1 6	,,	5,24,070	38,754	11 3 8	4,35,252 11 7	... ...	4,35,252 11 7	... ...	4,35,252 11 7		
29 Depositing do. do.	,,	47,744	1 5 8	,,	64,708	39,257	1 6 5	55,053 15 4	... ...	55,053 15 4	... ...	55,053 15 4		
30 Concrete in protection to Rubble Base	,,	1,700	9 10 6	,,	16,420	1,107	13 6 11	14,880 11 10	... ...	14,880 11 10	... ...	14,880 11 10		
31 Cramps, Iron	No.	259	11 7 7	Each	2,972	214	10 12 1	2,802 2 4	... ...	2,802 2 4	... ...	2,802 2 4		
32 Concrete capping	C. yds.	16,247	11 5 8	C. yd.	1,84,495	669	21 2 4	14,146 0 4	... ...	14,146 0 4	... ...	14,146 0 4		
33 Iron Caisson	No.	1	... ...	,,	18,000	...	...	21,750 6 1	... ...	21,750 6 1	... ...	21,750 6 1		
34 Preparing Base for and setting Cylindrical Pierhead	,,	...	...	,,	28,665	...	...	...	...	...	...	...		
Total for South Pier	.....	...	...	...	...	...	...	16,61,071 9 7	21,903 9 4	16,82,975 2 11	7,967 11 1	16,90,942 14 0		
Extending the Rubble Revetment protecting the foreshore North of Harbour.														
35 Rubble Stone Revetment	Tons	70,600	2 1 0	Ton	1,45,613	81,817	1 8 11	1,16,568 4 8	4,378 13 9	1,20,947 2 0	6,460 9 7	1,27,407 11 7		
36 Railway Lines	.....	.....	.....	.....	9,849	...	...	10,914 10 10	... ...	10,914 10 10	... ...	10,914 10 10		
					1,55,462			1,27,482 15 1	4,378 13 9	1,31,861 12 10	6,460 9 7	1,38,329 6 5		
37 Tools and Plant	.....	.....	.....	.....	6,11,656			6,39,534 7 6	2,835 14 2	6,42,370 5 8	508 15 4	6,42,879 5 0		
38 Contingencies	.....	.....	.....	.....	2,12,415			1,74,685 8 4	5,699 15 6	1,80,385 7 10	7,242 2 10	1,87,627 10 8		
39 Establishment	.....	.....	.....	.....	5,34,369			5,19,277 3 7	13,370 4 4	5,32,647 7 11	... ...	5,32,647 7 11		
40 Materials at site (concrete blocks in yards)	C. yds.	.....	.....	.....	...	11,350	14 7 1	1,99,265 5 8	40,528 7 1	1,58,736 14 7	5,211 5 4	1,63,948 3 11		
41 Advances to work-people	.....	.....	.....	.....	...			6,016 12 3	... ...	6,016 12 3	... ...	6,016 12 3		
Total of Estimate and value of work done	.....	.....	.....	.....	61,66,227			54,48,383 1 8	46,271 15 5	54,94,975 1 1	34,298 5 8	54,88,973 6 9		
Deduct Probable recoveries due to sales of Tools and Plant	.....	.....	.....	.....	2,77,331			−67,306 1 9	−3,240 9 8	−70,636 11 5	... ...	−70,636 11 5		
Total	.....	.....	.....	.....	58,88,896			55,40,906 15 11	43,131 5 9	55,84,638 5 8	34,298 5 8	54,18,336 11 4		
Total of revised Estimate sanctioned in Secretary of State Despatch, plus expenditure before 31st December 1884	.....	.....	.....	.....	1,20,83,386			1,18,95,397 14 9	43,131 5 9	1,19,38,529 4 6	34,298 5 8	1,19,72,827 10 2		
Estimated Cost of additional works found necessary up to end of last Quarter	.....	.....	.....	.....	...									
Estimated Cost of additional works found necessary during Quarter ending	.....	.....	.....	.....	...									
Total Estimated Cost for Completion of Works	.....	.....	.....	.....	1,20,83,386									
Deduct Total Expenditure as per column 11	.....	.....	.....	.....	1,19,38,529									
Total Estimated Cost of Completing Work after Quarter ending 31st March 1893	.....	.....	.....	.....	1,44,857									

Expenditure up to 31st March 1892 from commencement of works ... Rs. 1,16,47,274-11-1
During current official year from 1st April 1892 to 31st March 1893 ... 2,91,253-5-5
Total outlay to 31st March 1893. ... Rs. 1,19,38,527-16-6

MADRAS,
29th April 1893.

G. MOOTHOOSAWMY NAIDU,
Accountant,
M. H. Works Office.

A. LEE POGSON,
Engineer, Harbour Trust Board.

P. W. CURRENT No. 6093

[$\frac{10}{9}$]

2,000—15-6-93.

Current No. 5/8

Marine Department.

From

The Chairman

Harbour Trust Board.

Madras

No. 929

Dated 24th June 1893

Received 28th Do

Enclosures 4 Maps and 2 Spare copies

Recd: 8.7.93

SUBJECT.

Madras Harbour

Submitting report upon the progress upon the _____ for the quarter ending 31st March 1893.

No: 3 dt/13-4-93.
2158 W
1018-19 W dt/13-4-93

CS No 1152

Transferred to the Public Works Department

Fredk Prideaux

Secretary.

30.VI.93. Chief Secretary

CS 29/6.

3rd A-7

PUBLIC WORKS DEPARTMENT.

No 1884 W dt/21st July 1893.

PROCEEDINGS OF THE MADRAS GOVERNMENT.

1884 SW/93

READ the following

Endorsement in the Marine Department No 1152 dated 30th June 1893 on Progress Report of the Madras Harbour for quarter ending 31st March 1893 from the Chairman, H. T. Board, No. 929 dt/24th June

Ordered to be forwarded for the information of the Secretary of State and the Government of India.

(H.E. W No 1885 W dt/21st July 1893)

Copy of the above with a plan showing the progress of the work forwarded to the Government of India.

1884 W dt/21-7-93

To The Right Honorable the Secretary of State for India

My Lord,

In Continuation

To The Chairman, H. T. Board.
" Marine Department.

Q
217

Ms
5 pds

10—500-22-8-93.

...ared ...
...d/13th April 1893, we
...ave the Lowoon to
...orward, herewith, the
...rogress report of the
...adcas Harbour Works
...r the quarter ending
...st March 1893.

The report is
...ccompanied by two
...lans showing the
...osition and quantity
...work done during
...e quarter.

C. Lace, Esq.

Madras Harbour

Progress Report for

Quarter ending

31st March 1893

93

MWS
4793
No 1

20/7/93

C No. 6093

Govt. of (1893) Madras.

PUBLIC WORKS.

Dated 11th Sept 1893

Rec'd

Read

O.O. 21st/Sept 1893. No. 1884 6854 6 16844

Madras Harbour

Works

The progress report of the —— for q.e. 31.3.93 ordered to be forwarded for the information of the Secretary of State & the G.G.I.

—do—

Forwarding copy of the progress report of the —— for q.e. 31.3.93 together with [illegible] showing progress of the

—do—

Forwarding the progress report of the —— for q.e. 31.3.93 together with two plans showing the position & quantity of work done during the quarter

L.S. 60/4

26/11